GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXVII., No. 3328.] WEDNESDAY, MARCH 2, 1927. [79TH YEAR

EDITORIAL NOTES.

A Widespread Co-Operation.

UNDERLYING the words used and statements made by Dr. Charles Carpenter in the account of the stewardship of the Directors which he gave to the proprietors of the South Metropolitan Gas Company last Wednesday, there are meanings and lessons which are only apparent to thoughtful listeners to, and readers of, what he had to say. In a year such as that from which we have just emerged—a year filled with peril, and one in which the agents of subversion were violently wrestling with those who were working in defence of the community—acts have a telling force. It is, however, only those who are behind the scenes, and who experience the acts, who can inform us of them, though much is capable of being surmised. The year illustrates, as seen in Dr. Carpenter's address, how remarkably the blending of available power and resources can defeat those who war with law and order. We all know how the whole of the coalfields of the world contributed to maintaining the essentials of life in this country; and in making provision for coal from many lands and for its utilization and distribution in the best possible manner, the gas industry took a part which was impossible of emulation by any other industry. The South Metropolitan Company largely bought American coal; and the President paid handsome tribute to its quality—its low ash content and general clean character—and to its excellence for gas and coke making. The coal owners of this country should note experiences in this regard, and examine well the question whether they have not something to learn from their American compeers. Moreover, there was fair dealing on the part of the latter, and no disposition to take any advantage of our industrial troubles. In the case of the South Metropolitan Company, only the balance of requirements was obtained from the Continent. That is one example of the widespread co-operation that took place during the coal stoppage. Another is that, though much of the coal came from America in ships not specially designed for such work, and could not be cleared at the piers and jetties customarily employed by the Company, invaluable aid was rendered by the Board of Admiralty, whose courtesy placed at disposal facilities installed at both Portsmouth and Sheerness for the coaling of warcraft. This lightened the difficulties of the situation. There was also freedom from labour troubles in connection with the discharge of the coal, which showed that one important section of the industrial community was not sympathetic with the attempt of the miners' leaders to starve the country of an essential to the maintenance of the whole nation's life. We have yet to learn that the strikers and the miners' leaders did not gladly participate in the results of the struggles of the gas industry to maintain a satisfactory supply of light and heat for domestic and other purposes.

The story of co-operation did not end there. The Company's own fleet of colliers and men dealt with the transhipped coal; and the Company were in a position to aid with supplies—wholly or in part—some half-a-dozen other gas undertakings; and no less than thirty-one received from them supplies of coke for the manufacture of carburetted water gas. We have heard it remarked more than once during recent months that, if all gas undertakings had been the same as the South Metropolitan Company—coal-gas producers only—the difficulties of the country generally and of gas undertakings particularly, would have been considerably increased during the stoppage. But this revelation by the President of the Company at once disposes of any criticism of that kind. If the Company in normal times find it, through their situation, and a good coke trade with the Continent, better to make all their gas from coal, and can in times of emergency assist so many undertakings with coke for use in their water-gas plants, they are doing their part in the protection of the maintenance of gas supply, and are inflicting no burden upon anyone. In fact, in the circumstances of their collier resources, their methods of co-operation carried with it advantage which was spread over thirty-one gas-supply areas. If there is any idea that the Company are prejudiced against water gas, it is a mistake. Dr. Carpenter, in his address, declared: "We have no prejudices in this matter." It was only necessary to make that declaration for those whose memories are not sufficiently abiding to carry them back to the weighty evidence given by him before the Carbon Monoxide Committee and the Royal Commission on the Mining Industry. Further, there was co-operation by the Company through the supply to essential industries and establishments of large quantities of coke—for example, to the Metropolitan Water Board for their pumping stations, to manufacturers, hospitals, bakeries, and other food-producing concerns. Also during the days when cartage contractors' employees were (through the command of their leaders) participating in idleness, with no quarrel of their own in hand, and not even health recuperation as an excuse or legitimate reason, the Company's own employees drove lorries—possessed or hired—from the works with a view to maintaining some of the essential requirements of the community. It may again be pointed out that those who engineered this great disturbance of our national life did not refuse to take a share of the products of the work of other men, in order to satisfy their own personal needs. When statements of fact and experiences of the kind presented by Dr. Carpenter (which reflect what was accomplished within the ambit of their power by other gas undertakings) are pieced together and examined, they show, as did the great war, how innate, in the human race, when faced by great danger, is the spirit of co-operation. Even the General Council of the "T.U.C." knew they had done wrong directly they ordered the general strike; and they soon co-operated in undoing the evil they had wrought. Bad as were the effects of the action, the lesson was a good one. To attempt to starve and otherwise injure the whole population of a country with the view of benefiting a section of it is now admitted to be a dastardly act, calling from clean and sober minded men their best individual and collective endeavours to bring about its defeat.

The accounts and working of the Company during last year were examined in our issue for Feb. 16. There are only one or two points in this regard to which we will allude through references in the address of the President. It is quite true that it is incontestable that increases in the price of gas do invariably check consumption, while by falling prices the use of gas is stimulated. But last year cannot be held to give any substantial support to this rule, as the conditions were wholly abnormal. In the case of the Company, the price of gas went up during the

second half of the year by rather less than 15 p.ct., but the sale of therms only diminished, taking the whole year, by a fraction of 1 p.ct. But coincidently there was a substantial increase in the number of consumers and in the appliances in use; so that the expansion of the area of business did not suffer from the increase in price. And the relatively small reduction in the sale of gas has to be discounted by the restrictions on shop lighting, in connection with which the Company have developed in a notable manner high-pressure gas lighting, which with the rest came under the official ban, with the view of economizing coal. A word or two as to secondary products. Coke, of course, did well, and so did tar. But the Company have refused to take full advantage of the opportunity to obtain high prices for the latter, remembering what happened in 1920, when high tar prices were an invitation to the importation of bitumen for road purposes. Therefore the Company have been quoting prices which will allow of the continued use of tar both for road and briquetting—in other words, their policy has been to retain markets, and not to provide opportunity for the use of substitutes. This is the long view, and there is wisdom in it, although in times of pressure the temptation to get the best possible prices is great. The low value to which sulphate of ammonia, through synthetic nitrogen, has fallen also came in for comment, in which connection, Dr. Carpenter made this observation: "It is pretty cer-"tain that in our own works, handling over 1¼ million "tons of coal per annum, considerable readjustments of "our methods will have ere long to be undertaken. These, "I may say, are the subject of consideration and experi-"ment to-day."

Last year put the whole gas industry to severe test; but its experiences, like the wartime ones, are not without value. On the whole, it came through its difficulties well, and certainly with enhanced credit, as the address of Dr. Carpenter indicates. But, in our view, the varied interest, including achievements, which the industry has presented in the past—particularly in troubled years—will be transcended by what it will have to do, and will not fail in doing, in the future. In the developments, the South Metropolitan Company will contribute a good share—in one direction through what will be learned from the operation of the agreement which has been effected with the South Suburban Gas Company.

Tankless Holder for Ipswich.

THE Ipswich Gas Company have under construction the first tankless gasholder in this country; and there is rumour (we cannot speak authoritatively) that another Company have entered into a contract for one. This does not alter the fact that there are a number of British gas engineers who are desirous of further technical information, in view of the Posen explosion and the discussion of other points referring to the new type of structure. At the recent meeting of the Ipswich proprietors, the Chairman (Mr. Henry Woodall, M.Inst.C.E.) alluded to the Company's adoption of the new holder; and, in the course of his remarks, he made courteous allusion to a recent comment in the "JOURNAL" upon the holder. The one which is being put up at Ipswich will have a capacity of 2 million c.ft.; and the cost of the holder and foundations, the Chairman states, will be "some thousands of pounds less" than that of a holder in a tank. Ipswich is probably fortunate, in respect of cost, in having served as one of the entrance gates by which the holder is introduced, in corporeal form, to the British gas industry. We sincerely hope that the holder will never suffer anything of an untoward nature, will give the utmost satisfaction, and will accomplish all that is expected of it.

There seems to be some peculiar idea in certain minds that we have a deeply rooted prejudice against the tankless holder. Far from it; and our attitude is a plain one. It has been, and is, that at Posen, and (let us add) at other places—despite the fact that, Mr. Woodall says, everywhere he and Mr. Frank Prentice visited on the Continent, "they were told that they (the holders) had acted perfectly, and on no account would the owners revert to the older types"—there has been experience of escapes of gas into the empty space above the disc; and we have asked for information as to the character of the changes which have been made with a view to the prevention of such occurrences. The principle of the modern type is the same as of the earlier ones; and the alterations will have been in structural detail only. What is the nature of the modifications of which general, and not specific, mention is made? In the article which appeared in the "JOURNAL" for Feb. 16 (p. 369), we put a series of questions in the hope of receiving an answer. There is no attempt by Mr. Woodall—and there is no reason why he should do so—to answer those questions. We have written to the "M.A.N." London agents (who last year sent for publication a letter on the subject of the Posen accident) asking for information; but, so far, have not received it. However, in reference to the article in our issue of Feb. 16, Mr. Woodall said he ventured to think it went a little far in suggesting there was a possible "menace" in this form of holder, and he hinted that we had been, in this matter, "a little less judicial than usual." Let us replace the word "menace" in its context, as this will perhaps show whether or not we were a "little less judicial than usual." Alluding to the Posen disaster, we said it "raised the technical question—and it is an important one for gas engineers—as to whether the rising and falling disc, with its tar seal, and the varying empty space above the disc, do not in combination constitute a menace which is not present in holders of the column and spirally guided types." We regard that as being very judicially put, and fail to see anything of which to complain. It is the question for consideration; and it is for those concerned in exploiting this form of holder to put forward for consideration an exact statement as to the improvements that have been effected with the view of giving complete assurance of safety. It is certainly true that many of these holders have been erected in Germany and America. It is also true that nothing is being left undone that can be done, including inspection, to ensure for them a good reputation. Those who are responsible for the exploitation of the holder are not—and they are to be commended for it—unmindful of their own interests. Mr. Woodall also states that the holder will effect economies in working. The explanation of this is probably found in later words in Mr. Woodall's address: "Such holders gave constant pressure—not fluctuating as "did those of the ordinary type. This would save them "the considerable cost of pumping now necessary." As a set-off to that, the whole of the evidence given at the conference of German engineers (a report of which was published in our issue for July 21 last) was to the effect that the holders require very careful supervision, scrupulous attention to the tar pumping, and that the tar must strictly comply with specification, and be as free as possible from sulphur—sulphur having a considerable influence upon the thickening of tar. This all suggests a working requirement which does not attach to the predecessors of the tankless form.

Now let us repeat once and for all that what we are trying to obtain—and we know several engineers are interested in the effort, and would like more information than has yet been vouchsafed—is a description of the modifications which have been made, and which it is asserted will positively avert, during the life of a holder of this type, a repetition of the Posen catastrophe. To this end, we will submit again our former questions: Will the modifications definitely prevent the disc getting out of level? Will they keep the tar seal in such order, whatever the ruling temperature, that no leakage of gas can take place into the space between the disc and the roof? Are they of an order which give assurance that (whatever the nature of the stresses to which a holder is subjected) they will maintain its rigidity and conformation, which is important to the smooth and uniform working of the disc? Do they bring the new type of holder into line with their predecessors in respect of the small amount of supervision required? Let it not be supposed that because there is a desire to get complete assurance regarding a question of safety, it is due to any inordinate admiration for the old apothegm: *Via trita, via tuta.* Treading beaten paths may be safe; but the act does not always lead to progress; and the history of the "JOURNAL" is its defence against any supposition that progress is not a chief aim—that conservatism in means or method is an obsession. In this, even gasholders are included.

Growing Popularity of H.-T. Coke.

COKE produced by high-temperature carbonization was much sought after during the coal stoppage. Queues waited at the gas-works gates for the precious material; and many day by day had to go away disappointed. But that was in an abnormal time. We have to consider the probable position of gas coke in the days when coal is cheaper for the householder and industry than it is to-day. Perusing the paper which Mr. E. W. L. Nicol, the Engineer and Fuel Expert of the London Coke Committee, read before the London and Southern Junior Gas Association last Friday, those who have any present fear will be heartened as to the future, for the author was able to point to a big and growing demand in several directions in which at one time a market did not exist, and all due to the virtues of the material. It has taken a long time to discover those virtues. But it has been rather a matter of incorrect application than any inherent demerit, for if the carbon content is high, ash and moisture low, and the material is of the right size for purpose, it must be, properly used, a good fuel. We have been shown recently that the carbon content of coke is for most purposes more important in intrinsic value than volatile content, and that calorific value per pound is not the governing factor. At the same time, if the quality of coke and the range of its applications can be improved by practicable modifications in the carbonization process, well and good. On this point, we rather fancy Mr. Nicol is inclined to the view that to make radical modifications in any element of the process of carbonization, in order to alter the physical structure of coke so as to improve its ignitibility and combustibility, is only to pander to the continued existence of inefficient heating appliances, the proper place for which is the scrap-heap. If that is a correct interpretation of Mr. Nicol's words, then we are not prepared to side with him at the present stage of investigation; for we are rather hopeful that modification in the charge of coal in the retorts may result not only in improving coke characteristics, but be an advantage to the carbonizing process, in that blending non-coking coal with highly coking coal will help to effect a quicker transmission of heat through the charge by breaking-down the heat-resisting plastic layer—thus increasing throughput, and bringing within the range of gas makers coals which were formerly shunned, and which are cheaper. When Mr. Nicol tells us that "coal-selling organizations, anthracite combines, coke-ovens, and low-temperature interests" now appear "to be massing to capture and exploit the domestic fuel market," our view is that, if it is shown that improvement in coke-burning qualities can be effected, and at the same time produce advantage for the carbonization process, this will help to strengthen the hold of gas coke in the markets which the London Coke Committee and their energetic Engineer and Fuel Expert have done so much to develop.

It has been uphill work; but the paper is a record of progressive success, and a complete justification for seriously taking in hand the work of deposing the prejudice which had grown against gas coke, and which was perhaps due more to the neglect of gas undertakings in not preparing what was wanted, but leaving coke to find purchasers, where possible, in the crude state in which it was drawn from the retorts. Now, better instructed and more active, we see the important place that coke is taking, through the coke-fed domestic hot water boiler. The larger use of the gas-cooker which we have to-day, and the combination of a coke-heated boiler (or a gas circulating boiler or a geyser), make the use of crude coal for six or more months of the year totally unnecessary in our households. This is a factor of no mean importance in the commercial prospects of semi-coke; for it means that, for a large part of the year, it would have little demand, and the evidence shows that it is becoming more and more difficult for sellers of solid fuel to get householders to stock in the summer time. These are not conditions which would help the low-temperature systems to work economically—having to hold up stocks against a winter demand, with depreciation of the material proceeding the whole time, and no local organization to cultivate demand as has a gas undertaking. There would have to be reliance on an intermediate party, such as the coal merchant, who, with growing public appreciation of the merits of locally produced gas coke, would want a good incentive to make him market semi-coke from a distance. And, further, with gas making leaps and bounds in adoption for room heating in the winter, the competitive position of semi-coke would become more and more difficult. There is, of course, the 35 million tons or so of raw coal still in use for domestic purposes; and in that many long-sighted gas men see a good reason for improving the quality of their product—particularly if attended by advantage in the carbonizing process—so that it may be used in any and every form of grate, and give to the user the same excellent radiant effect as it obtained from coke burned in the more modern grates, or on the hearth as by the method advocated and practised by Prof. Boys. For low-pressure central heating boilers gas coke is an ideal fuel; and a valuable part of Mr. Nicol's paper is that where he gives evidence of conditions—such as at the County Hall, London—where gas coke has been proved to have advantages which makes it a superior fuel to Welsh coal. In the County Hall case, during periods of heavy load when using Welsh coal, the temperature of the waste flue gases ran as high as 950° Fahr.; and it became a question of lengthening the chimney shaft. But this was obviated by the introduction of coke, which reduced the temperature of the combustion waste products to approximately 500°. The reduction proves the relatively high radiant efficiency of gas coke. On this point, and the economic advantage of changing to gas coke at the County Hall, some interesting and useful information is given in the paper.

The value, too, of coke for steam-raising for trade purposes has been incontestably proved; and the high evaporative efficiency realized by it in Lancashire steam boilers is demonstrated in the paper. In one instance quoted—the Tooting Bec Hospital—the evaporation obtained throughout 1925 averaged over 10 lbs. per pound of coke, in which connection the supposition that coke requires an intense draught for its combustion is disposed of. Large power uses are also dwelt upon, and the excellent strides that have been made in the utilization of coke at such stations—mainly through the patented "Sandwich" system, which has been the means of absorbing big quantities of coke breeze, and of the finest description. An accompanying advantage is that it facilitates the use of inferior coal slack, which could not be employed alone on natural draught chain-grate stokers. It should be the business of all gas undertakings to develop this utilization of coke breeze, in view of the adoption of waste-heat boilers on gas-works, and the consequent release of larger supplies of breeze, which was formerly applied to steam-raising on the works themselves. Considerable business is being done in this direction; and there is room for its development.

Further Reflections on the Maintenance Conference.

BEFORE returning to certain points which are of considerable importance in connection with the problems associated with the inspection and maintenance of gas consumers' appliances—approval of the policy of which was given at the notable Maintenance Conference reported last week—it will not be out of place to refer to the striking speech made by the Prince of Wales at the dinner inaugurating the British Industries Fair in London and Birmingham. Among many other wise utterances, he alluded to the great opportunity there is for the younger men in industry to spread the new industrial gospel. He also stated that to keep in the van we must be conscious of that very valuable thing—the new knowledge we are gaining every day, and which we should apply. "Adopt, Adapt, and Improve," said the Prince. Another observation was: "It is not enough to produce the finest things in the world, "or even the cheapest, if we cannot get them into the "hands of the buyer (and we would add, keep his custom), "or cannot persuade him they are just the things he wants "to buy, and give him every inducement and convenience "to buy them." There is a great deal in those words which are very applicable to the trading problems of the gas industry to-day. We want to keep in the van; and, to do that, we are persuaded that the gas consumer must be offered every inducement and convenience to buy and use

our primary product. We have to face the facts of our new position, and to do so thoroughly. The gas industry is admittedly in a strong position; but all possible must be done to safeguard it, and to maintain—not only now, but in the future—the margin of our advantage over our competitors, who are not standing still in improving their methods, and who have some of the best available brains at work with a view to making greater progress. That progress must not be allowed by the gas industry, with means of prevention at hand, to be made at its expense. That would be folly.

To the points at the conference with which we had not an opportunity of dealing in our editorial columns last week. The first matter is the question of the system of inspection and maintenance. Those who have studied the report of the proceedings will find that in different places the methods utilized vary in detail; but all have the same objective. It is perfectly clear from the testimony that no one formula could apply to all local circumstances. Methods and organization must be built-up in the fashion best adaptable to the conditions of the supply area. We have as illustrations of the divergence in systems those of the Gas Light and Coke Company, Glasgow, Croydon (as explained by Mr. W. J. Sandeman at the conference), Colchester, Brighton, the North Middlesex Company, and Luton. From the published information concerning these examples, guidance can be obtained by those who contemplate inaugurating a scheme of their own. The question was raised as to whether it is better to sell appliances outright or hire them; or, as has been done in Dundee (as described at the conference by Mr. J. Dickson), instal cookers and fires free. In this respect, we have an inclination to side with those who do not believe in the free supply of appliances. Nevertheless, it would be very difficult to enter into any controversy with Dundee over their free supply of cookers and fires, as we should at once be met with a record of business advance by the undertaking which strongly supports the adopted policy.

This brings us to the question of the cost of inspection and maintenance. In business, we spend to earn. No one denies that the system does cost something; but, on the other hand, it pays. Let us consider what it attains. All the evidence points to the fact that a new standard of satisfaction is realized; increased business with existing consumers is done; through their experience, further consumers are obtained; and there are fewer complaints involving the expenditure of time and money. Without this service, experience shows dissatisfaction, complaints, loss of business, and (as those who have taken in hand a house-to-house inspection have found) in not a negligible number of cases dangerous conditions obtain. It is no use trying to hide proved facts in order to shun the responsibility which attaches to knowledge of them. Mr. Goodenough's advice to the waverers is sound, to try out a scheme on a small scale; and it will be found to pay handsomely. At the same time it must not be forgotten that a small-scale experiment gives no criterion of what will be the direct cost. It will only supply an indication as to the business advantages that reside in the system. The direct cost (considered altogether apart from the contra gains) has been proved by Glasgow and other places to decrease substantially as the scheme grows larger, as defects are removed, and there is less to be done per consumer, and as the men grow more accustomed to the work. This shows that the small experiment cannot avail as an indicator of what will be the ultimate cost, which experience assures, on a fully developed scheme, will only amount to a small fraction of a penny per therm. However, the direct charge has to be dealt with somehow; and the consumer must pay it. But he obtains advantage from the economies effected by inspection and maintenance, and to an extent which, we have no doubt, wipes-out the payment per therm.

Alternative methods are practised in dealing with the direct charge. One is to place it on the price of gas; the other on the rentals of appliances let on hire. The latter is no doubt the better plan, or would be so if all apparatus was out on hire. If the cost is placed on the price of gas, its incidence is greater on the good consumer than on the modest one, though using the same apparatus; whereas in equity the contrary ought to be the result. The nearest approach to equity for the largest number would be to increase hire rentals to the amount necessary to cover inspection and maintenance, and the price of gas to those who use their own apparatus. But this would invest the gas-trading system with complication; and thus the choice has to be between putting the charge on the price of gas or on rentals only. In the latter case the consumer with privately owned apparatus (under a free maintenance scheme for all consumers) would be paying less, though in practice it is likely that these are the best gas consumers, and perhaps deserve the advantage they would secure. The increase of hire rentals to meet the cost has much to support it, as anyone can see by reading the lucid argument advanced by Mr. Stephen Lacey in the discussion—one of the chief of its commendations being that it brings apparatus under the direct control of the gas suppliers right up to the scrapping and renewal stage. There is another aspect of the matter. It might be argued that placing the cost of inspection and maintenance on the price of gas would be to the disadvantage of stockholders under the sliding-scale; against which Mr. W. W. Townsend holds that, if maintenance is not adopted by sliding-scale undertakings, they will be jeopardizing their dividends. Is it better to protect the interests of the stockholders in sliding-scale companies by inspection and maintenance, or to neglect such protection in order that the price of gas may not ascend by a fraction of a penny per therm? We feel that, in this matter of whether the direct charge should come upon the price of gas or the rentals, the advice of Mr. A. W. Smith, of Birmingham, must be accepted. It is that, so long as there is agreement with the principle involved in the resolution passed at the conference, each undertaking must settle the question of procedure for itself. There are some who prefer a special charge for inspection and maintenance; but it is notorious that only a proportion of the consumers ever come under such a system. Those whose appliances require looking after the most are the very ones who will not pay a special charge for them to be kept in an efficient working state. A very pertinent question was submitted by Mr. A. H. Evans, Chairman of the Wallasey Gas Committee. He asked, What will it cost if we neglect maintenance? That inquiry every responsible gas administrator and manager should put to himself.

Throughout the discussion, a very strong point was made of the necessity for having, for inspection and maintenance work, men who have been properly and specially trained. The point was dealt with particularly by Mr. Goodenough; and the Chairman (Mr. John E. Cowen) also alluded to it. He dissented strongly from the view of some advocates of maintenance that a man should specialize in one class of apparatus. In his opinion (and it is a correct one, with probably the exception of water-heating apparatus and industrial appliances), to have a different man for each class of domestic apparatus, would cause householders annoyance, and he therefore advocates that training should be so comprehensive that any one man could undertake all the gas maintenance work in a house. On this point, Mr. H. H. Creasey gave some useful information as to the practices of the Gas Light and Coke Company.

In the resolution which was passed at the conference, only gas appliances were referred to, and not piping and fittings. Mr. Goodenough stated that the wording had been deliberately confined to "gas appliances" owing to the difficulty that would arise from having to examine pipes under floors and encased in the walls of rooms. Nevertheless, Mr. Harry Clark, of Derby, was strongly of opinion that pipes and fittings should be added to the resolution, and so cover all possible weaknesses in the internal gas-supply arrangements. As a photograph in our columns last week showed, he gave some striking evidence of the necessity for this. There was support of this view from Mr. J. P. Leather, who stated that at Burnley, right away from his father's time, inspection of pipes and fittings had been a regular proceeding. On the other hand, Mr. R. J. Rogers, of Birmingham, testified to the possibility of much being done by agreement. In Birmingham, during the last seven years, without legislation, the Gas Department have been able to induce at least 97 p.ct. of the builders to put in pipes to a specification prepared by the Department, and subject to their inspection. The addition to the resolution suggested by

Mr. Clark was not adopted; but, nevertheless, he holds that no maintenance scheme can be complete without a test of the internal fittings. There is no practical difficulty in a test for soundness, and one can be made quickly, cheaply, and efficiently, even though pipes are under floors and invisible through being placed in walls. Mr. Clark has called our attention to an ingenious pocket leak tester for internal fittings. It is only 1½ in. by 13 in. long; and it will indicate a leak of gas of as low as 1 c.ft. in 200 hours by air bubbles passing through water in a small glass bowl. At Derby, this apparatus is in constant use; and there is nothing but praise for it. An average test takes about 15 minutes. All that has to be done is to connect the instrument to the supply pipe against the meter outlet. When consumers have seen the bubbles passing through the water (which shows there is an escape of gas in the pipes or fittings), they have immediately given an order for the necessary work to be done to put the pipe system into a sound condition. We are sorry there was not more said at the conference regarding the testing of house pipes and fittings, as it might have been productive of more actual experience, because it does seem, from the discoveries which have been made on inspection of pipes and fittings, that this is a matter which, with a convenient appliance at hand, it would be well periodically to take in hand. Testing for soundness would not necessitate exploration under floors and cutting into walls to make hidden pipes visible.

It was an inspiring conference, which will effectively help along the road of adoption this highly important matter of inspection and maintenance. The resolution which was passed is to be sent for consideration to every organization in the gas industry; and it is probable that, at every district conference of the British Commercial Gas Association held this year, it will be one of the topics for discussion.

During the Coal Stoppage Year.

On two subsequent pages this week, we reproduce the customary annual analyses of the accounts of the London and principal Suburban Gas Companies, made by Mr. F. J. Bradfield, the General Manager and Secretary of the Commercial Gas Company. His calculations will, we feel sure, be examined on this occasion with more than ordinary interest, in view of the abnormal conditions which prevailed last year owing to the general strike and the seven months' coal stoppage, and their influence upon the expenditure and trading of the gas industry. It will be noticed that, due to the amalgamation of the Brentford Gas Company with the Gas Light and Coke Company, the former disappears from the analysis; but, in substitution, Croydon has been installed. One page of the workings are given on the therm basis; the other, at per 1000 c.ft. Of course, the real influences of the coal stoppage, during the last eight months of the year, are to an extent veiled and mitigated by the normal conditions which prevailed during the first four months. If it were possible to have the inflictions of the coal stoppage presented in the same comparative form, it would be found that the manufacturing materials used during that period would be at a much higher price per ton than is the case with the figures including the lower-priced materials purchased and delivered before the stoppage occurred; and the same point applies to the revenue from coke and tar. The stoppage of the coke-ovens throughout the country, and the larger use which was made of carburetted water-gas plants by gas undertakings (with the demand which was occasioned for coke by the absence of British coal supplies), raised the prices of both coke and tar to figures during the stoppage which are not reflected by taking the average of the whole year. These points are obvious; and yet perhaps it is well specially to mention them, in view of any investigation which may, in years to come, be made of the effects of the coal strike.

However, taking the complete year, it is seen that, in the case of the Gas Light and Coke Company, the cost of coal averaged 35s. 11·91d. per ton, compared with 28s. 3·59d. in 1925; South Metropolitan Company, 32s. 0·32d., as against 25s. 7·94d.; Commercial Company, 34s. 4·16d., as compared with 28s. 3·77d.; Wandsworth Company, 34s. 4·25d., as against 28s. 9·33d.; and Tottenham Company, 40s. 5·12d., as compared with 31s. 1·14d. The cost for the South Suburban Company was 39s. 6·12d., and Croydon, 45s. 6d.; but we have not at hand the comparative figures for these two concerns. The cost of coal, oil, &c., worked out, per therm sold, as follows: Gas Light and Coke Company, 5·39d., as compared with 4·51d. in 1925; South Metropolitan, 5·39d., as against 4·45d.; Commercial, 5·93d., as compared with 5·05d.; Wandsworth, 6·22d., as against 5·5d.; South Suburban, 6·82d., as compared with 5·74d.; and Tottenham, 6·14d., as against 4·94d. Deducting the revenue received for residual products, the net costs of coal, oil, &c., per therm sold were: Gas Light and Coke Company, 2·85d., as compared with 2·29d.; South Metropolitan, 2·41d., as against 1·8d.; Commercial, 2·18d., as compared with 1·98d. Wandsworth, 3·15d., as against 2·99d.; South Suburban, 3·94d., as compared with 3·48d.; and Tottenham, 3·89d., as against 3·11d. Under the heading of sundries in the tables, will be found an analysis of the receipts for secondary products. Among the several other interesting items are a comparison of the percentages of water gas on total make in cubic feet. In the case of the Gas Light and Coke Company last year, they distributed, in the total make 40·2 p.ct. of water gas, as compared with 31·17 p.ct. in 1925; Commercial Company, 22·61 p.ct., as against 19·22 p.ct.; Wandsworth Company, 21·84 p.ct., as compared with 14·87 p.ct.; South Suburban Company, 29·10 p.ct., as against 24·07 p.ct.; and Tottenham Company, 38·61 p.ct., as compared with 34·22 p.ct. Applied to the stoppage period only, the average figures would have been higher.

Working Agreement of the S.M. and S.S. Companies.

The proprietors of the South Metropolitan Gas Company and of the South Suburban Company, at their meetings last week, endorsed the working agreement which had been provisionally entered into between the Directors of the two undertakings. References in the "JOURNAL" for Feb. 2 (p. 268) and Feb. 9 (p. 306) gave information as to the nature of the agreement. It now only awaits the approval of the Board of Trade.

Summer Time.

It is reported that an agreement has been reached between the Governments of Great Britain, Belgium, France, and Holland in regard to summer time, which this year will begin on the night of Saturday, April 9-10. The return to normal time will be on Saturday, Oct. 1. From Holland, however, a denial comes that, so far as that country os concerned, any such arrangement exists. A Royal Decree in that country ordains that summer time will begin on May 15, and end on Oct. 2.

Electricity at Cookery Centres.

The attention of gas managers is directed to a paragraph in our "Electricity Supply Memoranda" this week regarding the views of the Education Committee of the London County Council on the subject of the incorporation at their cookery centres of electrical appliances for cooking. The opinions expressed in the report of the Committee are valuable from the point of view that the conclusions have not been drawn from any hasty investigation, but have been derived from a long-period test at four different centres, under the supervision of the responsible cookery teachers at the separate schools.

Gas Cooking and Heating Enterprise.

It is obvious that a big push is going to be made by the makers of heating and cooking appliances of all kinds during the exhibition season which has just commenced. We have seen the enthusiasm which is being displayed at the British Industries Fair, and which has also been noticeable in connection with more or less local displays. The makers are again in good force at the Ideal Home Exhibition—particularly gas and electricity. The electrical interests are still hard at work with their national six months' Wiring Campaign,

which includes demonstration houses in many parts of the country. They will not fail to be present at all the appropriate exhibitions—those of the larger and more or less national order, and those of local importance, with trade, industrial, and domestic economy objectives. For the gas industry the time is particularly suitable for making as much display as is reasonably possible. The coal stoppage led to a compulsory large reliance by the public upon labour-saving and smokeless means of obtaining heat for cooking, hot water supply, room warming, &c.; and this has stimulated thought and expanded experience regarding the advantages of being able to meet in this manner the requirements of households, industries, and business premises, rather than by the aid of smoke and labour producing coal. The continued briskness in the construction of new housing estates is another reason for keeping matters very much alive in these respects, and so informing not only architects and builders, but the public generally, regarding those things which we have to offer. Gas undertakings and the manufacturers of gas appliances of all descriptions are mutually interested in instructive demonstration. Gas-fires and gas-cookers provided notable displays at the recent Fulham Industrial Exhibition, and also at the Alexandra Palace. In both the London and Birmingham Sections of the British Industries Fair, gas appliances have an important part. In the kitchens of the heavy section at Birmingham, more than seventy gas-cookers and grillers are in use, as well as fourteen gas-heated vegetable boilers, and twelve gas-heated boilers for supplying hot water continuously. The London Section, it is understood, is being heated by 58 gas-radiators and 380 gas-fires. All this energy and display should produce good stimulus for the cooking and heating loads of gas undertakings.

Electricity on Housing Estates.

Probably warned by the discontent which was aroused on the Eltham Housing Estate of the Woolwich Borough Council through the compulsory use of electricity for cooking, the Liverpool Corporation are in their housing scheme constructing dwellings with flues, so that the tenants can please themselves as to whether they use gas, electricity, or oil for cooking and heating purposes. This is wise, in view of the propensity of electricity to fail at inopportune times. Apart from the question of health, it is a serious matter for houses to be constructed with flueless rooms, as a collapse of the supply of electricity might occur in the depth of winter, or on any day, just as the residents were preparing to cook their dinners. There is also the question of relative economy and efficiency. We see that the householders on the Priory Estate at Walthamstow have risen up in arms against the proposal to instal electric cookers in their kitchens. A sum of approximately £10,000 is to be borrowed for this purpose; but the tenants resent the intrusion upon their choice of a cooking agent, on the grounds of expense and the possibility of failures of the current. Some 130 of the 160 residents on the estate have signed a preference for gas. There is a similar movement on the Higham Hill Estate.

Wareham Electric Supply Company.

Upon the operations of this Company, among others, comment has been made from time to time in our columns. On Feb. 22, Mr. Justice Romer had before him a petition by Mr. W. E. Weston, of Hounslow (who is a shareholder), for the compulsory liquidation of the concern. According to a statement by Mr. C. A. Bennett, K.C., for the Company, the petition consists of no less than 68 paragraphs, and in the course of it there are charges of fraud. In view of this, Counsel asked his Lordship to direct that the allegations be properly verified by affidavit. The matter being *sub judice*, we cannot comment upon it; but content ourselves by pointing out that Mr. R. J. Willis, for the petitioner, asserted that the case was a serious one, and that they alleged very gross fraud perpetrated by the people concerned in the Company. Upon this Mr. Bennett remarked that the Company were carrying on business. Mr. Willis gave the further information that, within the previous few days, the Directors had issued a circular suggesting to the shareholders of this and other of their Companies the formation of a Trust into which they should exchange their holdings for debentures or bonds. His Lordship adjourned the matter for a fortnight for the necessary affidavits to be filed; and he observed that, in the meantime, the Company would deal with the assets at their peril.

Gas Oil Imports.

The demand for gas oil evidently continues on the high scale, inasmuch as no less than 16,172,153 gallons were imported during January, which compares with 2,337,073 gallons in January, 1926. The value of the gas oil received in January is returned at £320,542, compared with £38,144 in the same month last year.

Port Rates on Coal.

Succeeding a notification of a reduction in the price of coal to the householders in London and the Home Counties by 4s. for best grade and cobbles, and 3s. for kitchen, the welcome news was received that the Port of London Authority have decided to reduce the port rates of coal imported into London by 33⅓ p.ct. The new rates are: Inwards foreign coal and coastwise, 1d. per ton; outwards foreign and coastwise, ½d. per ton. The importance of these rebates is shown by the fact that between 8 and 8½ million tons of coal are now brought to London from the various ports in the Kingdom. Of the total, something like 1 million tons go away in bunkers of vessels trading in the port, or are transhipped. Coal imported into the Port of London and afterwards taken away in ship bunkers is exempt from the payment of port rates, as also is coal transhipped to other ports, provided there is compliance with certain conditions.

Scientific Workers' Union.

An appeal has been sent out on behalf of the National Union of Scientific Workers to professionally qualified scientists and technicians in the country, calling their attention to the scope and activities of the organization. The appeal is signed by some of our most prominent scientific workers. Reminder is given that the Union was founded in 1918, to promote the cause of science, and to improve the status of the scientific worker; but the membership is still below 1000, although there are probably ten times that number of persons eligible. It is claimed that the Union has been markedly successful in bringing about improvements in the conditions of service of scientific workers; and it is urged that, if membership were increased, the organization would be able to continue its labour with still greater success. There are some who fear the Union may be committed to "strike" action; but the last thing one would dream of is scientific workers going out on strike, and doing a little peaceful picketing.

National Mineworkers' Union.

On the labour side of the coal-mining industry a great cleavage has developed, as the result of last year's mad stoppage. Throughout the fields, energy is being shown by those who desire to clear the Reds from their areas, and to live a more peaceful life than has been the lot of the miner for some years past, through the activities of the shorn Federation. The scheme which is being developed is for the formation of a National Mineworkers' Union, which movement is being strongly combatted by the active spirits of the Federation—particularly by the firebrand Cook. The feeling that has been engendered is illustrated by the fact that Mr. G. A. Spencer, M.P., who has done so much for the miners in the Nottingham area in releasing them from the trammels of the Federation and its influences, has been ostracized by the Labour Party.

Employment.

The number of unemployed as recorded on the registers of the Employment Exchanges of Great Britain is still dwindling. The figure on Feb. 14 was 1,270,200. This is 33,293 less than seven days before; but 130,972 more than in the corresponding week of last year.

PERSONAL.

RESIGNATION OF MR. CHARLES WOOD.

Members of the gas engineering profession throughout the country will regret to learn that the breakdown, from neurasthenia, of which Mr. Charles Wood, F.C.S., the Bradford City Gas Engineer and General Manager, was a victim last autumn, has proved more lasting than expected, and Mr. Wood has felt it necessary to tender his resignation of a post he has occupied for the past 29 years. Mr. Wood went under treatment at a London nursing home in October, and lately left there with a view to recuperating on the south coast; but he has found it necessary to remain in the vicinity of the home. Coming to the conclusion that he cannot promise an early return to duty, he sent his resignation to Bradford. The Gas Committee, on Friday last, regretfully accepted the resignation, and passed a resolution placing on record their high appreciation of Mr. Wood's service to the Gas Department.

Mr. Wood, who is just over 60 years of age, went to Bradford in 1881, when his father (the late Mr. William Wood) was an official of the gas undertaking. Mr. David Swallow was the Borough Gas Engineer at that time; and Mr. Charles Wood began in the works fitting shops. Three years later he was appointed Superintendent of the Thornton Road Gas-Works. In 1890 Mr. Swallow, as the result of an accident, retired, and Mr. William Wood was appointed Gas Engineer. Mr. Charles Wood became Deputy Engineer. Mr. William Wood died at the end of 1897; and on January 1, 1898, Mr. Charles Wood succeeded him as Gas Engineer. During his 46 years at Bradford, the undertaking has developed greatly; the output having grown from 925 million c.ft. in 1881 to 2157 millions last year. Since he became Engineer, the output has increased from 1680 millions; and the undertaking has been enlarged by direct extensions and by incorporating the Airedale, Clayton, Allerton and Thornton, Eccleshill and Bolton, North Bierley, Heaton, and Frizinghall Gas Companies, a portion of the Shipley undertaking, and the private gas-works attached to Ripley's Dye Works. He was responsible for the remodelling on modern lines of the big works at Thornton Road, Valley Road, and Birkshall.

Mr. Wood has long taken an active part in the Institution of Gas Engineers, of which he was President in 1906. He is also an ex-President of the Manchester District Institution of Gas Engineers, Chairman of the Yorkshire Regional Joint Industrial Council for the Industry, and for over 25 years has been Chairman of the Yorkshire Commercial Section. He was awarded the O.B.E. in 1920, for the assiduous manner in which he performed additional duties during the war—especially in relation to processes in connection with the manufacture of explosives.

During Mr. Wood's recent absence from duty, Mr. E. J. Sutcliffe, Deputy Engineer, has been in charge, and is continuing so pending final choice of a successor.

The marriage took place at Edinburgh recently of Mr. A. PHILIP ALLEN, of Scarborough, to Miss Janet W. Dippie, of Edinburgh. Mr. Allen is the Engineer, Secretary, and Manager of the Scarborough Gas Company.

Mr. G. M. NAVE, B.Sc., who has been engaged as an Assistant Chemist in the Engineer's Department of the Newcastle-upon-Tyne and Gateshead Gas Company, has secured an appointment with the Northern Coke Research Committee at Armstrong College, Newcastle-upon-Tyne, and takes up his new duties at the end of March.

At the conclusion of the Annual General Meeting of shareholders of the Cradley Heath Gas Company on Friday last, the Chairman (Mr. Alfred Homfray) stated that in July last Mr. CHARLES DAKIN completed 50 years of service in the Company, first as Engineer and Secretary, and since 1919 as Managing Director. He referred to the efficient state of the undertaking and to the progress made during the long period it had been under Mr. Dakin's charge. As a mark of their affection and esteem, he asked him to accept a silver bowl and a pair of three-light candelabra, inscribed: "Presented to Charles Dakin, Managing Director of the Cradley Heath Gas Company, by the Directors and shareholders, as a token of their appreciation of his great services to the Company during the past 50 years. Feb. 25, 1927." In conclusion, the Chairman expressed the hope that Mr. Dakin would be spared to continue to guide the destinies of the Company for many years. Mr. J. H. Green (Director), Mr. Frank Somers, O.B.E., and Mr. Thomas H. Gough associated themselves with the Chairman's remarks. Mr. Dakin thanked the Directors and shareholders for the presentation.

OBITUARY.

We are sorry to learn of the death, which occurred at Bridport, on Feb. 17, of Mr. SAMUEL CARPENTER, aged 72. For the long period of 31 years, he was Engineer and Manager to the Dorking Gas Company. Then, after living for a couple of years in retirement, he accepted the invitation of the Cromer Gas Company to take up the position of Engineer and Secretary there. This he held for four years during the war period, when there was no young man available. Mr. Carpenter was President of the Southern Association in 1905, and was a member of the Evening Star Lodge. He leaves a widow, three sons (all engaged in the gas industry), and two daughters.

LUNCHEON TO SIR MALCOLM ROBERTSON, K.B.E., C.M.G.

Sir Malcolm Robertson, K.B.E., C.M.G., the British Minister in the Argentine, was entertained at luncheon at the Argentine Club on Thursday, Feb. 24, by Mr. P. A. Cooper, the Chairman of the Primitiva Gas Company of Buenos Aires, Ltd., and of the Province of Buenos Aires Waterworks Company, to meet a distinguished gathering of business men including Sir John Cadman, K.C.M.G., Chairman of the Anglo-Persian Oil Company, the Hon. Sir Arthur Stanley, G.B.E., Vice-President of the British and Latin American Chamber of Commerce, Mr. H. B. Binder, Chairman of the Buenos Aires Town and Dock Tramways, Ltd., and Mr. H. James Yates, Chairman of Radiation, Ltd.

Sir Malcolm Robertson, ever desirous of improving commercial relations between Great Britain and the Argentine Republic, welcomed the opportunity thus afforded him of exchanging views with so many leaders of British industry.

After luncheon, Sir Malcolm, with others of the party, visited the Central Research Laboratories of Radiation, Ltd., and the Kensington Showrooms of the Gas Light and Coke Company.

Sir Malcolm Robertson was interested to learn that most of the apparatus now being sent to Buenos Aires by the Primitiva Company was supplied by Radiation, Ltd.

NORTHERN STAR LODGE, No. 3053.

Installation Meeting.

The Installation Meeting of the Northern Star Lodge, No. 3053, was held at the Midland Hotel, Manchester, on Friday last, and was well attended by members and visiting brethren.

The Lodge was opened by the reigning Master, W.Bro. H. Butterworth, who later vacated the chair in favour of W.Bro. R. G. Shadbolt, P.Pr.G.D., P.Pr.G.W. (Lincs.), who conducted the ceremony of installing his brother, the Master-Elect, Bro. Samuel Shadbolt. The newly installed Master subsequently appointed and invested his officers, and presented a Past-Master's jewel to W.Bro. H. Butterworth, in recognition of his services during his year of office.

Feeling reference was made by W.Bro. Butterworth and W.Bro. R. G. Shadbolt to the loss the Lodge had sustained in the death of W.Bro. J. W. Broadhead, P.Pr.G.D. (West Yorks.), who was one of the founders of the Lodge and had taken a very active part in furthering the interests of Freemasonry in general. The brethren stood in silent reverence.

The following is a complete list of the officers for 1927-8:

W.M.	Bro. Samuel Shadbolt
I.P.M.	Bro. Harry Butterworth
S.W.	W.Bro. C. E. Teasdale
J.W.	Bro. Alexander Mackay
Chaplain	W.Bro. L. B. Taylor, P.Pr.G.D. (Staffs.)
Treasurer	W.Bro. T. W. Jordan, Pr.S.G.D.
Secretary	W.Bro. Maurice L. Williams
D.C.	W.Bro. R. G. Shadbolt, P.Pr.G.D., P.Pr.G.W. (Lincs.)
S.D.	W.Bro. W. J. Smith
J.D.	Bro. R. B. Glover
A.D.C.	W.Bro. James Bridge
Almoner	W.Bro. R. J. H. Sayers, P.Pr.A.G.D.C. (West Lancs.)
Organist	W.Bro. E. J. Wellens
I.G.	Bro. Harold Hutchinson
Stewards	Bro. James Mitchell Bro. George P. Mitchell Bro. Joseph Hall Bro. John T. Haynes Bro. R. W. Broadhead Bro. J. H. Clegg Bro. D. Gibb Bro. H. Kendrick Bro. H. R. Crow Bro. F. J. Rogers
Tyler	W.Bro. H. Firth
Charity Rep.	W.Bro. S. Meunier, P.Pr.G.D.

A banquet was held at the conclusion of the Lodge meeting; the W.M., W.Bro. Samuel Shadbolt, presiding. The loyal and usual Lodge toasts having been pledged and honoured, the toast of "The Visitors" was responded to by W.Bro. Robert P. Vale, the W.M. of the Murdoch Lodge, No. 3480, and visitors representing other Lodges.

INSTITUTION OF CHEMICAL ENGINEERS.

New Members Elected Feb. 9.

Members.

C. P. Finn, B.Sc., F.I.C., Manager, Washeries and Coke Oven Departments, also Brickworks Departments of the Manvers Main Collieries, Ltd.

J. W. Mitchley, M.I.Mech.E., Chemical Engineer and Gas Engineer to Messrs. Blair, Campbell, & McLean, Ltd., Govan.

F. S. Sinnatt, M.Sc.(Tech.), F.I.C., Assistant Director of Fuel Research, Department of Scientific and Industrial Research.

J. D. Troup, M.I.Mech.E., Editor of "Engineering and Boiler House Review."

Associate Members.

C. E. Brooks, Engineer and Draughtsman, the United Alkali Company, Ltd.

T. Haworth, Chemist and Assistant Gas Engineer to the Oswaldtwistle Urban District Council Gas-Works, Church.

W. H. Simmons, A.I.C., Joint Manager of Plant Department, Messrs. Trost Bros., London.

A. Speedy, Chemical Engineer to Messrs. A. G. Spalding & Bros., Ltd., London.

F. C. Sutton, Joint Manager of Plant Department, Messrs. Trost Bros., London.

D. R. Wattleworth, Assistant Manager, Coke, Bye-Product, and Tar Distillation Works, Harrington Coke Ovens, Ltd.

"B.C.G.A." MIDLANDS DISTRICT CONFERENCE.

The following is the programme for the "B.C.G.A." Midlands Conference, which will be held on March 16 in the Municipal College, Crockett's Lane, Smethwick, under the presidency of the Mayor of Smethwick (Councillor F. H. Jones, J.P.)

Morning Session.

10.45 a.m. Special buses will leave the City of Birmingham Gas Department's Showrooms, Edmund Street, to convey members travelling *via* Birmingham to Smethwick. [There is also a frequent service of trams leaving Birmingham (Edmund Street) for Smethwick.]

11.0 a.m. Reception by His Worship the Mayor (Councillor Frank H. Jones, J.P.) and the Mayoress (Mrs. Frank H. Jones) at the Council House, Smethwick.

11.30 a.m. Visit of inspection to the works of the Birmingham Aluminium Casting (1903) Company, Ltd., Dartmouth Road, Smethwick, by the courtesy and kind permission of Mr. Frank W. Gower, Managing Director. One of the most up-to-date die casting foundries in the Kingdom for the production of motor car parts will be seen at the works of this Company. The heating required is provided by town gas, and involves the use of over 150 million c.ft. per annum.

1.15 p.m. Luncheon at the Smethwick Municipal College, Crockett's Lane, by invitation of the Chairman and members of the County Borough of Smethwick Gas Committee.

Afternoon Session.

2.45 p.m. Public Conference (Smethwick Municipal College).
Opening remarks by the Chairman of the Smethwick Gas Committee, Alderman C. W. Pinkney, J.P.
Paper by Dr. C. M. Walter (Engineer-in-Charge, Industrial Research Laboratory, Gas Department, Birmingham) on "Industrial Heating by Town Gas: Its Advantages and Its Relation to the Conservation of Fuel."
Discussion to be opened by Sir Arthur Duckham, K.C.B., followed by Mr. A. Lindsay Forster, of Glasgow.

4.15 p.m. Afternoon tea, and close of Conference.

7.30 p.m. Lecture by Dr. C. W. Saleeby, F.R.S. (Edin.), in connection with the "Clean Air Campaign Week," at the Princes Hall, Smethwick.

COAL AND BYE-PRODUCTS EXPORTS.

The returns relating to the export of coal and gas coke in January indicate that normal conditions, aided by the prices quoted, are being quickly restored; but bye-products other than coke do not present a healthy appearance.

Coal Exports.

The quantity of coal shipped during January was 4,092,879 tons. In the same month of 1926, it was 4,148,042 tons; and in that of 1925, 4,366,051 tons. The values of these tonnages were: January, 1927, £4,290,806; 1926, £3,821,336; 1925, £4,708,978. Of these figures, gas coal represented in January 556,910 tons, of a value of £527,116—an average per ton of 18s. 11·16d. In January, 1926, the shipment of gas coal was 562,516 tons, of a value of £459,835; and in 1925, 551,776 tons, of a value of £572,718.

Gas Coke.

The market abroad for British gas coke picked up considerably in January, but was far behind the business in the corresponding month of last year. The quantity sent overseas was 55,785 tons, of a value of £68,333—an average, within a negligible fraction of a penny, of £1 4s. 6d. per ton. In January, 1926, the figures were 137,751 tons, and £139,832; in 1925, 63,806 tons, and £99,878.

Tar Products Shipments.

In January, 18,861 gallons of benzole were sent abroad, as compared with 357,527 gallons in the first month of last year. The respective values were £2966 and £30,712. Naphtha had a very poor demand—only 1288 gallons were shipped, as against 183,63 gallons in January, 1926. The respective values were £149 and £1658. There was a heavy drop, too, in the shipments of tar, oil, creosote, &c. The total in January was 1,414,023 gallons, as against 4,648,484 gallons in January, 1926. The value in January this year was £47,239, as compared with £141,388 in January last year.

Sulphate of Ammonia.

In January, sulphate of ammonia again experienced a heavy drop in demand from the markets abroad. The quantity shipped only amounted to 8514 tons, which compares with 22,786 tons in January, 1926. The value in January was £97,193, as against £290,375 in January, 1926. The shipments to Spain and the Canaries and Japan showed heavy falls; and the Dutch East Indies (to which 5943 tons were shipped in January, 1916) dropped entirely out of the picture.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

March 4.—London and Southern District Junior Gas Association.—Twenty-fifth anniversary celebration dinner at the Criterion Restaurant, W. 1.

March 4.—Manchester District Institution of Gas Engineers.—Annual meeting at the Midland Hotel, Manchester, preceded by luncheon at one o'clock.

March 5.—Wales and Monmouthshire Junior Gas Association.—Meeting at Cardiff. Paper by Mr. T. V. Blake on "Some Experiences in Distribution."

March 5.—Midland Junior Gas Association.—Visit to the Stanton Ironworks.

March 8.—Federation of Gas Employers.—Meeting.

March 8.—National Gas Council.—Meeting.

March 9.—Junior Gas Associations.—Education Conference.

March 9.—British Commercial Gas Association.—Meeting of General Committee at No. 28, Grosvenor Gardens, S.W. 1.

March 9.—Royal Society of Arts.—Paper on "The Utilization of Gas Coke," by Dr. E. W. Smith.—John Street, Adelphi, W.C., at 8 o'clock.

March 9, 10.—Institution of Chemical Engineers.—Conference at Burlington House, Piccadilly, W. 1.

March 11.—Institution of Chemical Engineers.—Fifth annual meeting and annual dinner at the Hotel Victoria, Northumberland Avenue, W.C. 2.

March 12.—Scottish Junior Gas Association (Western District).—Meeting at the Royal Technical College, Glasgow. Paper by Mr. Robert Fife, of Kilmarnock, on "Metals Used in Gas-Works Practice."

March 16.—Yorkshire Junior Gas Association.—Joint meeting with the Manchester and District Junior Gas Association. Visit to the works of the Elland Gas Company and to Messrs. R. Dempster & Son.

March 16.—British Commercial Gas Association.—Midlands District Conference at Smethwick.

March 17.—Midland Junior Gas Association.—Meeting in Birmingham. Paper by Mr. A. St. D. Corder.

March 24.—Midland Association of Gas Engineers and Managers.—Visit to the Stanton Ironworks.

March 25.—London and Southern District Junior Gas Association.—Meeting at the Westminster Technical Institute. Short papers by Mr. J. H. Goldsmith and Mr. S. H. Miles.

March 26.—Scottish Junior Gas Association (Eastern District).—Visit to the Dundee Gas-Works.

March 26.—Scottish Junior Gas Association (Western District).—Visit to the Tradeston Gas-Works, Glasgow.

March 30.—Southern Association of Gas Engineers and Managers.—Annual general meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

April 1.—British Commercial Gas Association.—North Wales, Cheshire, and Lancashire District Conference at Wallasey.

April 8.—North British Association of Gas Managers.—Annual spring meeting at Dumbarton.

May 5.—Eastern Counties Gas Managers' Association.—Spring meeting at Ipswich.

May 5.—North of England Gas Managers' Association.—Annual meeting at Newcastle.

May 20.—British Commercial Gas Association.—Manchester District Conference at Buxton.

May 26.—Midland Association of Gas Engineers and Managers.—Spring meeting at Dudley.

Institution of Gas Engineers.

March 7.—Emergency Committee, Finance Committee, Refractory Materials Joint Committee.

March 8.—Advisory Committee on Education.

June 14-17.—Annual General Meeting in London.

ELECTRICITY SUPPLY MEMORANDA.

The Initial Expenses.

WHEN the new Electricity Board settle down to the real business for which they were appointed, they will find that some considerable expenditure has already been incurred for which they will be responsible. They are to pay all the money the Government expended in work done by independent outside technical advisers during the preliminaries involved by the Electricity Bill and its passing into law. Lieut.-Col. Ashley recently gave the House of Commons some information regarding the disbursements. In 1925, £15,000 was voted for the purpose. A further sum of £5000 was subsequently included in the estimates; but this was insufficient to meet the expenses up to Dec. 15 last, when the Bill became an Act. The sum now required is £14,000. These figures total to £34,000, *plus* 5 p.ct. interest; and this will all be recoverable from the Board after March 31, when they begin to function. The Labour-Socialists in the House do not like the modicum of information which the Minister of Transport has thought fit to impart as to how the money has been expended. They think more particulars should have been vouchsafed; but Lieut.-Col. Ashley's only reply is that not a penny has been spent without parliamentary sanction. According to programme, the first meeting of the new Board was held yesterday, but it is stated that the business was to be confined to the selection of a Secretary and other officers, and the formulation of the business to be dealt with at succeeding meetings. At present the Board are meeting at the Ministry of Transport. But to continue that would make the Board look too much like a departmental pendant, and so it is understood headquarters will eventually be found for them in Victoria Street. They will be able to breathe more freely there.

Electric Cooking and the L.C.C.

The Education Committee of the London County Council have, since July 31, 1923, been considering the question of incorporating electric cooking in their educational centres. It cannot be said that the results of their investigation of the matter have suffered from hastiness or lack of thoroughness. The Committee reported on May 19, 1925, that they had arranged for experimental electrical installations at four cookery centres. After a careful watching of these, an interim report was submitted on Jan. 19 of last year, in which it was stated that the Committee had authorized the experiments to continue for another year, at the end of which they would submit a further report. Now we have the result, which was submitted to the Council on Tuesday last week. So as not to be charged with misrepresentation, we quote *in extenso* the statement of the Committee:

> The experiments have been under observation by the Council's inspectors, who have submitted statistics of the relative cost and efficiency of cooking by gas and cooking by electricity. We have carefully considered this information; and it would not appear that, either as regards efficiency or cost, the use of electricity has any definite advantage over other methods of cooking, or *vice versa*. We are advised that the extent to which electric stoves have been, or are likely in the near future to be, generally adopted is very limited, and that there do not appear to be any essential differences in the principles of cookery instruction whether by gas or by electricity—the main factor being the management of the stove.
>
> It is a basic principle of the teaching of domestic economy that pupils shall be trained to use efficiently such equipment and materials as are available in their own homes. This being so, we are of opinion, in view of the information we have had before us, that unless and until the time comes when cooking by electricity is proved to be definitely more economical than cooking by gas—giving rise to a widespread desire on the part of housewives for electrical equipment in preference to gas—no special case exists for the general introduction of electric cooking into the Council's domestic economy centres.
>
> For the present, therefore, we propose that, in centres where electric cookers have already been installed, their use shall be continued; that, when new accommodation for domestic economy is projected in districts where the majority of homes from which the children come are served by electricity, electrical cooking apparatus shall be installed in addition to the ordinary gas equipment; and that in other cases no action shall be taken, except when the supply authorities are prepared to furnish and instal electric equipment on exceptionally favourable terms. We propose to consider such cases on their merits.

The "vice versa" in the first part of this statement—referring to the view that it would not appear that, either in respect of efficiency or cost, the use of electricity has any definite advantage over other methods of cooking—is a point concerning which there could be some discussion, having regard to the poor and (with time) diminishing efficiency of the elements which constitute the hotplate of the electric cooker, and the fact that a unit of electricity has a potential thermal value of only 3412 B.Th.U. We are, however, satisfied with the subsequent statement that "unless and until the time comes when cooking by electricity is proved to be definitely more economical than cooking by gas, giving rise to a widespread desire on the part of housewives for electrical equipment in preference to gas, no special case exists for the general introduction of electric cooking into the Council's domestic economy centres." These views should be useful to gas undertakings in cases where the educational authorities in their districts are contemplating installing electric cookers at their teaching centres. Clear it is that the Education Committee of the L.C.C. are not enamoured of their experiences at four different cookery centres. Probably, had they chosen, they could have said more than is contained in the report.

Gas Cookers for Tenement Houses.

Touching a kindred subject, we see the Housing Committee of the London County Council have decided to adopt gas for cooking in forty-eight tenements in Rollit House and Branston House, Ring Cross Estate, at Islington, but electricity for lighting purposes. The conditions on which an agreement has been made are as follows: The Gas Light and Coke Company will lay service-pipes and provide a cooking-stove in each tenement subject to a payment by the Council of £1 per tenement, provided that the Company are free to fix one lighting point in the scullery or kitchenette. The gas will be supplied through prepayment meters at the usual rates. The Islington Borough Council decline to undertake the wiring of the tenements; but they are prepared to lay the necessary cables to the buildings, and to supply electricity to the tenements at the ordinary rate, which is at present 4⅜d. per unit, *plus* 10 p.ct. It is estimated that the cost of wiring the tenements will be £436; and the Housing Committee propose that there shall be included in the weekly rents an amount sufficient to cover the debt charges and cost of maintenance. We are of opinion that, having regard to the increase of rent involved by the inclusion of a charge for wiring and maintenance, the tenants would have found it cheaper had the equipment for lighting purposes been off the same service-pipe as will supply the cookers.

Installation Tendering.

We all know that electric installation work, compared with that for gas, is an expensive matter. We are also aware, having had many illustrations in the past, that it is extremely necessary for strict specification to be made as to electrical requirements, and that the invitations for tenders should be well distributed, inasmuch as there is a tremendous divergence between the values put upon the work. The London County Council last year decided to employ electricity for general lighting on the Hornsey Rise Estate; and the Housing Committee were authorized to arrange for the purchase of electricity in bulk, and for its distribution to the tenements through prepayment meters. Second thoughts, however, have led them to the view that it would be better for the current to be supplied by the Islington Borough Council direct to the tenements, and that the cost of the wiring and maintenance of the installation (to be borne by the Council) should be recovered from the tenants by the inclusion of a suitable sum in the weekly rent. By this arrangement, the necessity for the provision of prepayment meters will be obviated, and will result in a reduction of the capital expenditure to be incurred by the Council. In view of this, the Committee asked for tenders for the wiring of three blocks of dwellings on the estate for electric lighting; and, in response, they obtained fifteen tenders, which ranged from £1267 10s. up to £3860 0s. 6d.—that is to say, the lowest tender was only one-third of that of the highest. The one accepted was at £1375 9s. 3d., which was the lowest completed tender received, and is below the Chief Engineer's comparable estimate of £1920. The Committee report that the total expenditure—including provision for sub-mains and housing the supply authority's meters (£250) and other incidental expenses—is estimated not to exceed £1750.

Flueless Houses.

Scientists, architects, and even politicians appear to be decidedly opposed to the construction of flueless houses for the purposes of making them the preserves of electric heating, and of assisting to develop conditions which would be detrimental to the health of the occupants. We see that Lt.-Commander Kenworthy, M.P., has registered his protest against the construction of houses without flues. He has recently been in America, where, he says, an important lead has been given by passing legislation restricting the use of flueless gas appliances. He suggests that the Ministry of Health should tackle the problem of ventilation at the root by forbidding the building of flueless houses. That is precisely what it is hoped by many men the Ministry will do, so as to prevent those authorities who own electricity undertakings, and are housing authorities, from constructing air-tight boxes, which are not fit for habitation. Lt.-Commander Kenworthy finds that,

in some districts, the growing sentiment in favour of smoke abatement and labour-saving is being exploited by the introduction of economies at the expense of sound and hygienic construction; and he suggests that the reduction of the subsidy limit may be a temptation to builders to make further undesirable experiments. He adds that, if the Government really believe the subsidy limit can be lowered at this stage, it is their very clear duty to show local authorities where building economies are permissible, and where they are not. In the case of Liverpool, the Corporation have shown that economies in space and money can be effected by substituting hollow concrete block or brick flues for the wasteful chimney breast in several rooms of each house. This not only gives the occupier the choice of coke, gas, electricity, or other smokeless fuel, but it also ensures that every room has that ventilation which is vital to health.

Mishaps.

We see from reports in provincial papers that Swansea was without a supply of electricity for four hours on Feb. 15. Trams, works, and collieries were held up. The residents in the vicinity of Ratho Street, Greenock, were somewhat perturbed by a loud report on the 13th ult. It was caused by an explosion, which blew-off two manhole covers, and fractured the flagstones of the pavement. The door of an electric lamp was also wrenched off. The whole trouble was due to the fusing of an electric cable An explosion occurred at Greenock on the 16th ult., in a shop in East Hamilton Street; and the place was entirely wrecked. It is surmised that the explosion was caused through an electric wire fusing, and igniting an accumulation of gas in the back premises. Regarding the explosions at Hackney and Acton (to which reference was made in the news columns of the "Journal" last week), it has been erroneously assumed that coal gas was the cause of these; the evidence points to electric cables and their bitumen insulation being the origin of the mischief. The Grosvenor Hotel at Shaftesbury, Dorsetshire, has been considerably damaged by fire. A number of bedrooms, a new ballroom, and the laundry have been almost completely destroyed. The disaster occurred during the progress of a dance in the early hours of last Thursday morning. The seat of the fire was apparently in the laundry; and, simultaneously with the outbreak, there was a failure of the electric light throughout the hotel. The same day, a Southern Railway driver was standing on the coal bunker of his stationary engine at Sutton Station when his head came in contact with the overhead electric wire. He was immediately electrocuted.

GLOVER-WEST VERTICALS AT LEVEN.

The Buckhaven and Leven Gas Commissioners took over from the Town Council of Buckhaven and Methil the Leven and East Wemyss gas undertakings, which had been acquired by the latter authority in 1920. Last annual returns show a total gas make of approximately 110 million c.ft.—74 millions being manufactured at the Leven Gas-Works, and 36 millions at the East Wemyss Works. The consumers total 6460, comprising 1999 ordinary and 4461 prepayment meter consumers. The mileage of mains is some 33; while a total of 613 public lamps are supplied.

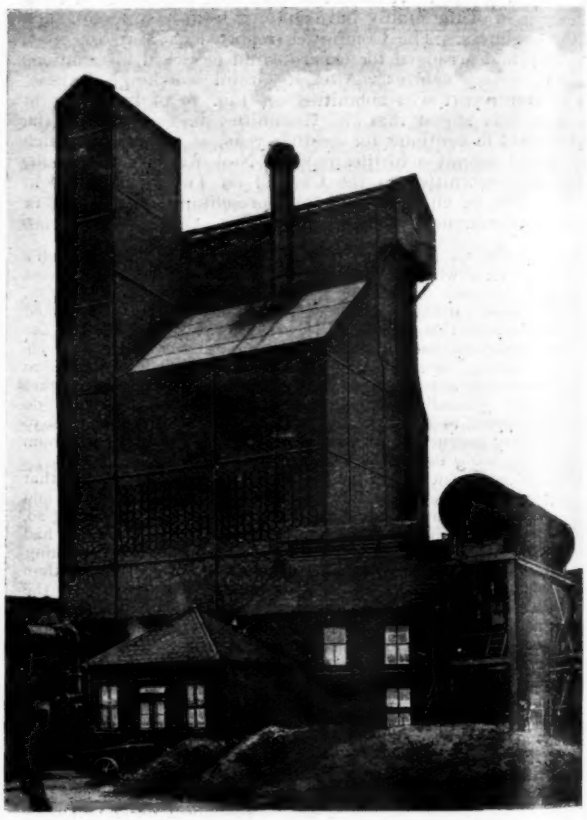
Following a recommendation by the General Manager, the Gas Commissioners decided to effect improvements in their manufacturing plant, and to centralize the manufacturing operations of the undertakings at the Leven Gas-Works, with a view to more economical production. Preliminary to the introduction of the vertical retorts, compressing plant was installed at the Leven Gas-Works, and a high-pressure main laid connecting the two works.

The New Installation.

From an account which appears in "West's Gas" (the official organ of West's Gas Improvement Company, Ltd.), it is learned that the Glover-West vertical retort installation is built upon a ferro-concrete raft foundation supported by 29 precast piles driven an average depth of 23 ft. 4 in. The bench, which is capable of producing 900,000 c.ft. of gas per day, consists of 12 retorts, 25 ft. long, 33 in. by 10 in. at the top, arranged in three settings, each of four retorts; each setting comprising two units of two retorts each. The retorts are heated by means of two producers, each capable of serving two, four, six, or eight retorts. The installation is complete with coal and coke handling plant, in the form of a West lip-bucket conveyor encircling the bench and capable of dealing with 30 tons of coal per hour. An automatic mechanical lubricator ensures constant and adequate lubrication while the conveyor is in use. The coal breaker is belt-driven and capable of dealing with 25 tons per hour. Coke is dealt with by the same conveyor, and is dropped direct into the buckets from the discharging doors, or can be wheeled away to the yard in barrows. A 20 cwt. electric hoist is conveniently placed inside the retort house for the purpose of elevating coal and coke from store to overhead storage hoppers. A suitable arrangement of platforms allows ready access to any part of the plant from the hoist. The producers are fed from the coke hopper by means of a bogie, which is filled from a chute at producer platform level. A chute and screen are led outside the retort house for the purpose of filling carts.

The waste-heat boiler is of the natural draught water-tube type, capable of evaporating 1000 lbs. of water per hour from and at 212° Fahr., and is fitted with coil superheater, automatic water feed, high and low water alarm, and feed pumps in duplicate. Provision of a surplus steam valve allows all steam not used on the plant to pass through into the works steam range at 100 lbs. pressure, while, should the pressure in the waste-heat boiler fall below 60 lbs., the valve allows the return of steam from the works range to the vertical plant.

Gas and steam engines have been arranged in duplicate for driving the coal plant and extractor gear respectively. A suitable arrangement of pipes and valves has been fitted, whereby the exhaust steam from the extractor engines is led back into the low-pressure steam line under the bench, for steaming the retorts and thereby utilizing the waste steam. Considerable pains have been taken by the Gas Department in respect of the lighting of the installation. An adequate number of three-light lamps, fitted with patent lighting device, have been arranged at suitable points on the plant, and the whole are controlled by a series of taps placed at convenient positions where they can be switched on or off as the plant operator proceeds to or from the respective platform stages of the plant, thus ensuring efficient lighting at a minimum cost.



Erection of the Leven plant was effected in the difficult circumstances prevailing consequent upon the coal crisis. Gas-making operations were commenced on the termination of the dispute, and before normal coal supplies had become available. The coals carbonized at the outset consisted of a mixture of American and Silesian. Nevertheless, carbonizing operations in the horizontal plant were immediately discontinued, and the full load of the Leven Works was taken up by the vertical retort plant, since which time the entire load of the combined gas-works has been dealt with by the new installation.

FRENCH GAS ORGANIZATIONS.

Constitution of an "Union Syndicale": Dissolution of the Société Technique.

For some time it has been realized by the French gas industry that some measure of reorganization of their ruling bodies is necessary to ensure a stronger and more united policy.

Hitherto there have been the Syndicat Professionnel, which corresponds more or less to our National Gas Council, and the Société Technique, comparable with our Institution of Gas Engineers. What has now been done, so we learn from recent numbers of our contemporary, the "Journal des Usines à Gaz," is to make these two organizations branches of one "Union Syndicale." To this end the Statutes of the Syndicat Professionnel were altered at a general meeting held on Jan. 7 last.

As regards the Société Technique, this body was incorporated in 1901 under a charter which legally prevented its adherence to such a Union. It was therefore necessary to dissolve the Société Technique; and in its place has been constituted the "Association Technique de l'Industrie du Gaz en France," which will include, on their demand, all the members of the original body.

The "Union Syndicale" will have as President and Vice-President respectively the Presidents of the Syndicat and of the Association Technique. The latter will be subsidized, according to needs, from the considerable income of which the Union is possessed, and so will be enabled to carry on its technical work in a manner worthy of the French gas industry.

DISSOLUTION OF THE SOCIETE TECHNIQUE.

An extraordinary general meeting held on Feb. 3 unanimously decided upon the winding-up of the old technical society; and out of 681 members, 477 were present in person or represented. After a review by the President of the considerations which led the Committee to recommend dissolution, the latter was pronounced—without reserve, and in conformity with Article 19 of the Charter. Thereafter, MM. Marcel Lebon and Pierre Mougin were appointed Liquidators, responsible to the Finance Committee; and it was resolved that the net proceeds should be handed over to the Bureau of Scientific and Industrial Research and Invention.

1927 PROGRAMME TO STAND.

More than 500 of the old members had, on Feb. 3, indicated their wish to enrol in the Association Technique; and it is expected that all will do so. The first meeting will be held early in April.

There is to be no alteration in the arrangements made for the current year. The Gas Week, which has become an annual event, will be from May 16-21; and the Annual Congress—to be held in Lille at the invitation of the Compagnie Continentale du Gaz—is fixed for June 20-25.

"HUWOD" VIBRATING SCREENS FOR SMALL COAL AND COKE.

An interesting and efficient machine which is being installed by collieries throughout the country for screening small coal and coke is the "Huwod" vibrating screen, illustrated in fig. 1. The "Huwod" screen is an entirely new type of electro-vibrator, which has been designed for accurately grading materials into any number of sizes from 2-in. down to 200-mesh; and its outstanding characteristics are efficiency, low running cost, easy installation, and low price.

In most cases, it is possible to guarantee over 98 p.ct. efficiency on the "Huwod" screen; and this is due to several distinctive features—such as the high frequency and intensity of the vibrations, and the provision of a handwheel for adjusting the inclination of the mesh, so as to allow for variations in the proportions of the various sizes or in the humidity of the material passing over the screen.

It will be seen from the illustrations that the vibrator and screen form one self-contained unit; the vibrator being coupled to the screen by a wooden yoke, so that no transmission parts such as belts, gears, or shafts are required. This results in a considerable saving in the space and headroom usually required for a vibrating screen, and also means that the cost of upkeep will be correspondingly reduced, due to the fewer moving parts.

Fig. 1.—Front View of "Huwod" Screen Installed at a Kent Colliery. Note the size of the belt conveyor feeding the screen.

To instal the "Huwod" screen, it is merely necessary to bolt the yoke by means of four ¾-in. bolts to a horizontal channel-iron (drilled with a hole for the adjusting wheel to pass through) and to connect the leads from the motor to the electric supply. This is clearly shown in fig. 2. The power consumption of the "Huwod" screen is exceptionally light; the vibrator consisting of an ordinary ¼-H.P. electric motor.

Messrs. Hugh Wood, whose London office is at 65, Fenchurch Street, E.C. 3, claim that "Huwod" screens are ideal for separating small coal and coke breeze for blending and other processes, and consequently have a particular application in the gas industry. A number have already been installed by collieries in this country and abroad.

The following table shows the high capacities in tons per hour which are being obtained on "Huwod" screens:

Size Mesh.	Coal.	Coke.
1½-in.	125	60
1 -in.	100	50
½-in.	75	40
¼-in.	50	26
10	22	14
20	15	8
40	5	1½

The illustrations show a "Huwod" screen installed at one of the Kent collieries.

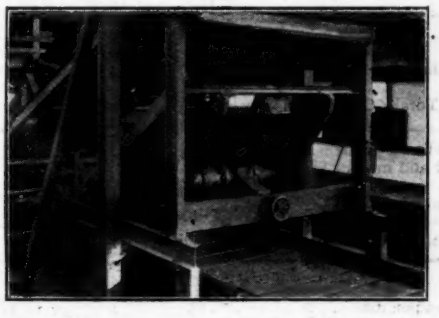


Fig. 2.—Rear View of "Huwod" Screen, showing vibrator and method of attaching the screen by four ¾-in. bolts to a horizontal channel-iron.

Manchester District Institution of Gas Engineers.—On Friday next at 2.30 the annual meeting of the Institution will be held at the Midland Hotel, Manchester, under the Presidency of Mr. C. S. Shapley, of Leeds. There will be luncheon at one o'clock.

Yorkshire Junior Gas Association.—A joint meeting of this Association and the Manchester and District Junior Gas Association will be held on Wednesday, March 16, at Elland. The Elland Gas-Works and the Works of Messrs. Robert Dempster & Sons, Ltd., will be visited.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER THERM SOLD FOR THE YEAR 1926.

Compiled by Mr. F. J. BRADFIELD, the General Manager and Secretary of the Commercial Gas Company.

	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Croydon.
Declared calorific value B.Th.U.	500	560	475	470	500	500	500
Gas sold on declared calorific value therms	225,222,430	89,388,894	19,828,320	16,415,709	17,519,271	15,209,745	12,801,827
Increase per cent.	2·30	*Dc* ·46	·82	6·14	3·94	2·38	3·9
Gas made per ton coal on works tests therms	69·851	73·54	69·68	70·24	68·30	67·97	67·43
Gas unaccounted for per cent.	3·84	1·48	5·45	7·02	6·82	5·37	4·17
Coke made for sale per ton of coal . cwt.	10·15	9·76	11·92	8·52	9·07	9·86	9·15
Tar made per ton of coal . . . gallons	9·71	9 85	8·92	9·30	10·01	6·88	9·94
Liquor made per ton of coal . . gallons, 8 oz.	33·68	40 59	37 98	35·60	35·97	33·87	38·50
Percentage of coke used as fuel	9·52	19·46	11·69	20·24	26·99	22·63	23·77
Capital expended per therm sold	s. d. 1 8·43	s. d. 1 4·49	s. d. 1 6·93	s. d. 1 7·98	s. d. 2 0·18	s. d. 1 11·22	s. d. 2 1·89
Price of gas per therm . . (L'day, Mid. .) Mich's., Xmas.	d d 9·4 9·4 9·4 9·6 (& 10 6	d. d. 8·75 8 75 9·5 10 5	d. d. 9·4 9·4 9 8 9 8	d. * d. 8 4 8·4 8·4 10 0	d. † d. 11·0 11·0 10·4 10 4 (& 11 8	d. d. 9·6 9·6 9·6 10·0	d. ‡ d 9 8 9 8 9 8 10·4 (& 11 0
Costs per Therm Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	5·39	5·39	5·93	6·22	6·82	6·14	6·91
Less residuals—Coke and breeze . . .	1·99	2·13	2·96	2 27	2·27	1·66	2·47
Tar	·47	·66	·55	·71	·54	·49	·46
Amm. liq. and sulph. amm.	·08	·19	·24	·09	·07	·10	·10
Total residuals . .	2·54	2·98	3·75	3·07	2·88	2·25	3·03
Net for coals, oil, &c.	2·85	2·41	2·18	3·15	3·94	3·89	3·88
MANUFACTURE—							
Salaries	·13	·21	·15	·22	·23	·16	·20
Wages—carbonizing	·45	·58	·57	·56	·67	·56	·60
Purification	·05	·14	·09	·17	·07	·09	·06
Repairs—plant	1·96	1·85	1·96	1·93	1·43	1·65	1·50
Net manufacture . .	5·44	5·19	4·95	6·03	6·34	6·35	6 24
DISTRIBUTION—							
Wages and salaries	·52	·31	·33	·44	·45	·28	·62
Repairs—Mains and services, &c. . . .	·68	·59	·51	·87	·88	1·26	·48
,, Meters and prep. meters and fittings	·50	·86	·62	·56	·75	·43	·29
,, Stoves—ordinary and prepayment .	·71	·52	·70	·78	·54	·50	·41
Total net manufacture and distribution	7·85	7·47	7·11	8·68	8·96	8·82	8·04
Public lamps—lighting and repairing . . .	·12	·16	·08	·14	·19	·19	·15
Rents, rates, and taxes	·61	·38	·53	·27	·31	·51	·30
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.).	·09	·10	·14	·13	·15	·15	·19
Collectors	·19	·20	·29	·21	·19	·20	·25
Stationery and general charges	·14	·20	·16	·18	·13	·12	·18
Profit-sharing	·09	·18	·12	·28	·19	·13	·20
Bad debts	·01	·01	·01	·01	·01	·00	·01
Law and parliamentary charges	·01	·00	·01	·01	·02	·00	·00
Superannuations, Pension Funds, &c. . . .	·16	·19	·24	·19	·28	·18	·20
National Insurance	·07	·08	·06	·08	·05	·07	·04
Sundries	·00	·01	·00	·00	..	..	·00
Total expenditure (*less* residuals) . .	9·34*b*	8·98	8·75	10·18*d*	10·48	10·37	9·56
GAS	9 51	9·02	9·01	9·65	10 91	9·60	10·18
Rentals—Meters and prep. meters and fittings	·83	·73	·79	1·12	·66	·42	·51
Stoves	·46	·38	·52	·97	·59	1·70	·48
Incand. mantle maintenance . .	..	..	02	·13	..	·00	..
Miscellaneous	·03	·02	·01	·02	·01	·02	·03
Total—Gas, rentals, &c.	10·83	10·15	10·35	11·89	12·17	11·74	11·20
Balance, being profit	1·49	1·17	1·60	1·71	1·69	1·37	1·64
Dividend and interest	1·68	1·45	1·61	1·55	1·67	1·54	1·94
Surplus or Deficit.	*Def.* ·19	*Def.* ·28	*Def.* ·01	·16	·02	*Def.* ·17	*Def.* ·30
Contributions to funds and sundry payments .	·11*c*	..	..	·08*e*	..	..	·06*g*
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	35 11·91	32 0·32	34 4·16	34 4·25	39 6·12	40 5·12	45 6
Coke realized per ton of coal	15 7·59	12 6·21	18 9·58	12 7·04	15 0·04	12 10·75	17 1·97
Coke ,, ,, of coke	30 9·77	26 5·42	31 6·45	29 6·59	33 1·09	26 1·83	37 6·33
Breeze ,, per ton	14 3·47	2 2·66	8 10·47	11 7·49	8 2·18	6 4·43	15 0 00
Tar realized per gallon	0 4·95	0 4·74	0 4·72	0 5·42	0 4·34	0 4·62	0 3·81
Amm. liquor, &c., realized per butt, 8 oz. .	2 3·88	2 11·57	4 5·89	1 10·84	1 5·50	2 9·36	2 4·71
Percentage of stoves at rental to consumers .	92	114	99	96	117	89	102
Bad debts per cent. on total receipts . . .	·07	·06	·04	·05	·05	·01	·06
Net profit per cent. on ordinary capital . .	4·69	4·43	5·26	7·49	6·47	6·25 *f*	4·48 *h*
One fifth penny variation equals gross. . . .	£187,685	£74 491	£16,524	£13,680	£14,599	£12,675	£10,668
Water gas per cent. on total make of cubic feet.	40·20	..	22·61	21·84	29·10	38·61	41·74

a—Before benzole extraction.
b—Exs. Brentford amalgamation eliminated.
c— ·07d. exs. Brentford amalgamation. ·04d. redemption fund. ·11*c*.
d—Excluding special purposes fund.
e—Special purposes fund.
f—Including electricity results.
g—Stamp duty.
h—Excluding stamp duty.

ADDITIONAL PRICES:
*—Wimbledon 1d. Epsom 2·2d.
†—Outlying districts—Lady Day and Midsummer, 1·2d.; Michaelmas and Xmas, 1d.
‡—Caterham ·8d.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER 1000 C.FT. SOLD IN THE YEAR 1926.

Compiled by Mr. F. J. BRADFIELD, the General Manager and Secretary of the Commercial Gas Company.

	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Croydon.
Gas sold . . . . . thousands	45 044.486	15,962,303	4,174,383	3,492,704	3.503.854	3.041.949	2,563,365
Increase . . . . . per cent.	2·30	*Dec.* ·46	·82	6·12	3 94	2·38	3·29
Gas made per ton of coal carbonized. cubic feet	13,030	13,104	13.904	15,137	12,471	13,380	12,441
Gas unaccounted for . . . . . per cent.	3·84	1·48	5·45	7·02	6·82	5·37	4·17
Coke made for sale per ton of coal . cwt.	10·15	9·76	11·92	8·52	9·07	9·86	9·15
Tar made per ton of coal. . . . . gallons.	9·71	9·85	8·90	9·30	10 01	6 88	9·94
Liquor made per ton of coal . . gallons, 8 oz.	33·68	40·59	37·98	35·60	35 97	33 87	38·50
Percentage of coke used as fuel	19·52	19·46	11·69	20·24	26·99	22·63	23·77
Capital expended per 1000 cubic feet sold . . .	s. d. 8 6·16	s. d. 7 8·37	s. d. 7 5·90	s. d. 7 9·89	s. d. 10 0·91	s. d. 9 8·12	s. d. 10 9·45
Price charged per 1000 cubic feet { L'day, Mid., Mich's., Xmas.	s. d. s. d. 3 11 3 11	s. d. s. d. 4 1 4 1 4 5·2 4 10·8	s. d. s. d. 3 8·65 3 8·65 3 10·55 3 10·55	s. d. * s. d. 3 3·48 3 3·48 3 3·48 3 11	s. d. † s. d. 4 7 4 7 4 4 { 4 4 &4 11	s. d. s. d. 4 0 4 0 4 0 4 2	s. d. ‡ s. d. 4 1 4 1 4 1 { 4 4 &4 7
Costs per 1000 Cubic Feet of Gas Sold. REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	26·93	30·20	28 18	29·23	34·12	30·72	34·56
Less residuals—Coke and breeze.	9 94	11·96	14·07	10 68	11·37	8·28	12·35
Tar	2·33	3·67	2·63	3 33	2·68	2·47	2·32
Amm. liq. and sulph. amm.	·42	1·05	1·13	·42	·36	·51	·50
Total residuals . . .	12·69	16·68	17·83	14·43	14·41	11·26	15·17
Net for coals, oil, &c. .	14 24	13·52	10·35	14·80	19·71	19·46	19·39
MANUFACTURE—							
Salaries	·64	1·20	·72	1·04	1·16	·78	·98
Wages—carbonizing	2 26	3·26	2 68	2·63	3·34	2·80	2·99
Purification	·27	·76	·45	·79	·36	·47	·32
Repairs—plant	9·78	10·35	9·30	9·09	7·13	8·26	7·51
Net manufacture . .	27·19	29·09	23·50	28·35	31·70	31 77	31·19
DISTRIBUTION—							
Wages and salaries	2·61	1·71	1·57	2·06	2·24	1·37	3·11
Repairs—Mains and services, &c.	3·43	3 32	2·41	4·10	4·41	6·29	2·41
" Meters and prep. meters and fittings.	2·48	4 83	2 98	2·66	3·75	2·15	1 45
" Stoves—ordinary and prepayment .	3·55	2·90	3·32	3·65	2·71	2·52	2·02
Total net manufacture and distribution .	39·26	41·85	33 78	40·82	44·81	44 10	40 18
Public lamps—lighting and repairing	·59	·88	·38	·65	·97	·94	·72
Rents, rates, and taxes	3·04	2·13	2·54	1·26	1·53	2 53	1 49
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	·44	·58	·67	·60	·76	·73	·96
Collectors	·93	1·12	1·36	1·00	·96	1·00	1 27
Stationery and general charges.	·71	1·13	·75	·83	·66	·60	·91
Profit-sharing	·45	·99	·56	1·33	·95	·67	·98
Bad debts.	·05	·04	·03	·04	·04	·01	·05
Law and parliamentary charges	·05	·02	·06	·03	·09	·02	·01
Superannuations, Pension Funds, &c.	·81	1·06	1·12	·9	1·38	·89	1·01
National Insurance	·34	·43	·30	·36	·27	·36	·22
Sundries	·03	·05	·02	·02	..	..	·00
Total expenditure (*less* residuals) . . .	46·70*a*	50·28	41·57	47·84*c*	52·43	51·85	47·8
GAS.	47·58	50·53	42·80	45·33	51·55	47 99	50·89
Rentals—Meters and prep. meters and fittings.	4·15	4·10	3·77	5·27	3·30	2·09	2·56
Stoves	2·30	2·14	2·44	4·56	2·95	8·48	2·42
Incand. mantle maintenance . . .	..	..	·08	·60	..	·01	..
Miscellaneous	·14	·09	·07	·11	·06	·11	·12
Total—Gas, rentals, &c.	54·17	56·86	49·16	55·87	60·86	58·68	55·99
Balance, being profit	7·47	6·58	7·59	8·03	8·43	6 83	8·19
Dividend and interest	8·42	8·14	7·62	7·27	8·36	7·69	9·69
Surplus or deficit	*Def.* ·95	*Def* 1·56	*Def* ·03	·76	·07	*Def.* ·86	*Def.* 1·50
Contributions to funds and sundry payments . .	·53*b*	..		·40*d*	..	..	·28*f*
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	35 11·91	32 0·32	34 4·16	34 4·25	39 6·12	40 5·12	45 6·00
Coke realized per ton of coal	15 7 59	12 6 21	18 9·58	12 7·04	15 0 04	12 10 75	17 1·97
Coke " " of coke	30 9·77	26 5·42	31 6·45	29 6·59	33 1·09	26 1·83	37 6·33
Breeze " per ton	14 3·47	2 2 65	8 10 47	11 7·49*b*	8 2·18	6 4·43	15 0·00
Tar realized per gallon	0 4·95	0 4 74	0 4·72	0 5·42	0 4·34	0 4·62	0 3·81
Amm. liquor, &c., realized per butt (8 oz.) . .	2 3·88	2 11·57	4 5·89	1 10·84	1 5·50	2 9·36	2 4·71
Percentage of stoves at rental to consumers . .	92	114	99	96	117	89	102
Bad debts per cent. on total receipts . . .	·07	·06	·04	·05	·05	·01	·06
Net profit per cent. on ordinary capital . . .	4 09	4·43	5·26	7·49	6·47	6·25 *e*	4·48*g*
Water gas per cent. on total make of cubic feet .	40·20	..	22 61	21·84	29·10	38·61	41·74

a—Exs. Brentford Amalgn. eliminated.
b—'34d. Exs. Brentford Amalgn.
'19d. Redemption Fund.
'53d.

c—Excluding Special Purposes Fund.
d—Special Purposes Fund.
e—Including Electricity Results.
f—Stamp Duty.
g—Excluding Stamp Duty.

ADDITIONAL PRICES:—
*—Wimbledon 4·7d.
Epsom 10·34d.
†—Outlying Districts—Lady Day and Midsummer 6d.; Michaelmas and Xmas 5d.
‡—Caterham 4d.

THE ASSESSMENT OF GAS CONSUMERS.

By NORTON H. HUMPHRYS.

The following remarks refer to the subject commonly dealt with and known as "The Assessment of Gas Undertakings." And as the methods and procedure for arriving at a fair valuation of industrial undertakings in general are now under supervision, prominent attention may be directed to the fact that the usual expression should be revised as above, because the consumer is the party directly interested, although the undertaking, in a subordinate way, will have something to say. Certainly, the rate collector calls at the gas office, and not on the individual gas consumer; but the sums paid to him are simply passed on to the consumers in the form of a surcharge on each unit (1000 c.ft. or therm) of gas sold, through the medium of the revenue account. (See the model forms of accounts, Schedule B, Gas Companies' Clauses Act, 1871.) In effect, the gas undertaking collects the rate from each consumer, and hands it over to the rate collector, free of commission or other remuneration for the trouble. Those who happen to be no strangers in Assessment Appeal Courts will remember the important and influential member of the Board of Guardians, who also happens to be a consumer of gas in some quantity, but chuckles over a substantial increase in the assessment of the local gas undertaking, without the slightest notion that he is personally interested.

But what are the facts? A certain gas company may be paying £1000 per annum on the basis of a standing valuation. This sum is duly debited in the revenue account, but eventually passed on to the sales of gas. Assuming that these total 100 million c.ft. per annum, it takes the form of a charge of 2·4d. per 1000 c.ft., or the equivalent per therm. A user of 100,000 c.ft. will pay £1; of 1,000,000 c.ft., £10; and other quantities on the same basis.

But a time may arrive when the local authorities are desirous of appropriating credit for apparent economy in public expenditure by means of a reduction in poundage, though no alteration in amount is possible. Among others, the local gas undertaking may be selected as a victim for increased valuation—a course that can be facilitated by the elaborate and round-about methods of valuation in vogue, which can be made to prove almost anything. With the assistance and approval of the gentleman above named, the assessment is increased to the extent of 50 p.ct. on the original. Taking the annual sales as unaltered, the surcharge on each 1000 c.ft. of gas sold will now be 3·6d. The 100,000 c.ft. customer now pays £1 10s.; and the 1,000,000 c.ft. consumer £15. Perhaps the price of gas need not be immediately adjusted to suit this increase of expenditure. The cost of coal or some other item may have fallen in more than a similar proportion. This makes no difference to the consumer, because the prospects of a reduction are hindered to exactly the same extent.

No evidence respecting the £500 is likely to be found in the profit and loss account. Both local and national taxation have increased by leaps and bounds, as the control of expenditure slowly passes out of the hands of rate or tax payers who have to foot the bill, to a class who practically contribute nothing towards meeting it. But the regulations as to limitations of dividends remain unaltered, with few exceptions; and the only form in which the enormously increased burden of taxation appears in the profit and loss account is the deduction on divisible profits for income-tax, which in a general way has been met by a proportionate increase in percentage. Concerns formerly accustomed to be satisfied with 7 or 8 p.ct. now find that the value of their property and the raising of additional capital on reasonable terms cannot be effectually secured on less than the full 10 p.ct.

Some years ago, the Gas Light and Coke Company had occasion to inform their customers that they collected rates as above instanced, to the extent of 2·5d. per 1000 c.ft. of gas sold. This is a very substantial amount; but many smaller undertakings would be thankful to get off with double. Several cases could be quoted where the rate and tax collectors get more money out of the concern than the shareholders; and in one instance a small concern paid nothing to the shareholders during the war years, but was mulcted in 10 p.ct. of the sales of gas for rates and taxes.

Even some directors of gas undertakings are known to be decidedly hazy respecting the differences between capital, revenue, and profit and loss. So there is nothing remarkable if those high in authority and responsibility fail to discriminate justly on questions that call for intimate acquaintance with such detail, or to understand that debits in revenue are paid by the customer, and those in profit and loss by the stockholders; and that the revenue is charged with all local rates, super-tax on the entire profit, and the full tax on profits applied to various reserve accounts or carried forward.

The general rule is to charge interest on overdrafts to profit and loss; but there is room for discrimination. These undesirable acquisitions may include overdrafts on capital that will be repaid when circumstances are favourable to a new issue; they may represent extensive work in progress, or losses chargeable to special purposes, depreciation, or other form of reserve. That the first is a clear charge on profits will not be disputed; the second may be open to discussion, according to the nature of the case; but there can be no doubt about the third being a fair charge on revenue. The year 1926 has provided a striking example. Many gas undertakings have been compelled to draw largely on their bankers during the last few weeks, in order to meet enormous coal bills. The interest on such overdrafts is an item in the extra expenses due to the strike, and not an ordinary trading expense.

Payments under national health, unemployment, or employers' liability insurance are always included in revenue, and paid by the consumers; but there are differences of opinion as to how far they are employers' contingencies, or a benefit to the workers. In the first place, they are chargeable under No. 11, in the second under No. 4. They are mentioned here as a charge in which the consumer is directly concerned. An addition of £500 under those headings is, in effect, the same as if coming under rates, coal, repairs, or other item of revenue. Yet consumers of gas have been known to rejoice over an addition to these responsibilities, either as "getting more out of the employer" or as another nail in the coffin of capital. As much might be true if the concern is already loaded near to breaking-point; but it is utterly fallacious when applied to the ordinary run of gas undertakings.

An increased assessment, or an increase in the price of gas, rarely secures a permanent and proportionate increase of income, because it may lead to reductions in the quantity sold, and consequently to loss of profit. In a general way, a rise of prices means reduced demand, and hence the common saying that the largest profits are made on the lowest prices. Here the interest of the gas undertaking comes in, especially where, on account of small scale of operations or other unfavourable circumstances, the price of gas has already approached the limit that the consumers, in modern commercial language, will "stand." Taxation may reach such a point as to illustrate "killing the goose that lays the golden eggs." The home trader finds his sales passing to a neighbour, or to imported goods; and the overseas merchant observes that his market pitch is fully covered by foreign competitors more favourably situated as regards production.

Anything that adds to the price of gas is a national inconvenience—not to say misfortune. The greater part of the users of gas are persons of limited means, to whom every shilling is a matter of importance. Some daily newspapers have recently given a leading position in their columns to comments on the price of gas, and made no bones about a demand for an immediate return to 1925 rates. They ignore the fact that, although the strike began on May 1, the increased prices for gas, with a few exceptions, did not come into full operation until Oct. 1, and then were not more than a very modest proportion of the additional expenses. They were limited to about 20 p.ct. on the previous price; and in the same issues of papers notices of 80 p.ct. in profits on the sale of other commodities were recorded as ordinary news calling for no special reference. Could we have a better testimonial of the prominent position occupied by gas as a necessary in modern civilized life—showing that cheap gas is, to say the least, as essential to national wellbeing as reductions in cost of another agent for distributing light, heat, and power?

The assessment of the gas consumer should bear a simple and direct proportion to the profits, based on facts that can be verified and figured on in the course of a few minutes, without room for two opinions, rather than built-up by an elaborate process on the rotten foundation comprising nothing more tangible than a fabulous and impossible freak of imagination known as the "hypothetical tenant," which may result in "valuations" differing to the extent of 100 p.ct. or more. And "profits" should be the sum that can be divided or appropriated under Act of Parliament, not a fictitious figure that may greatly exceed it. How can the "profits" of a company be reasonably fixed as £20,000, if they cannot legally divide or appropriate more than £15,000?

The oldest among us will have some dim recollections of the occasional letting of a gas-works on lease, not so much as a sound business proposition, as because the owners were not competent to manage it themselves. A skilful tenant, under such conditions, could do better both for the consumer and the company, and also make a personal profit. But the auction clauses referring to the sale of additional capital, and the limited rates of dividend on the latter, were the death warrant of the practice of letting gas undertakings on lease. A reasonable rent for the owner, and a living profit for the tenant, cannot by any possibility be extracted from an average of 6 p.ct. on the expended capital. Apart from this, the losses during war time, and by labour disputes as experienced in 1921 and 1926, effectually strike out gas undertakings from the lists of properties described by auctioneers and agents as profitable or desirable lettings. In fact, many capitalists would not, in 1927, be inclined to invest in property not likely to command a rent of more than 6 p.ct.

A valuation exceeding the statutory profit is bad enough; but

W-D

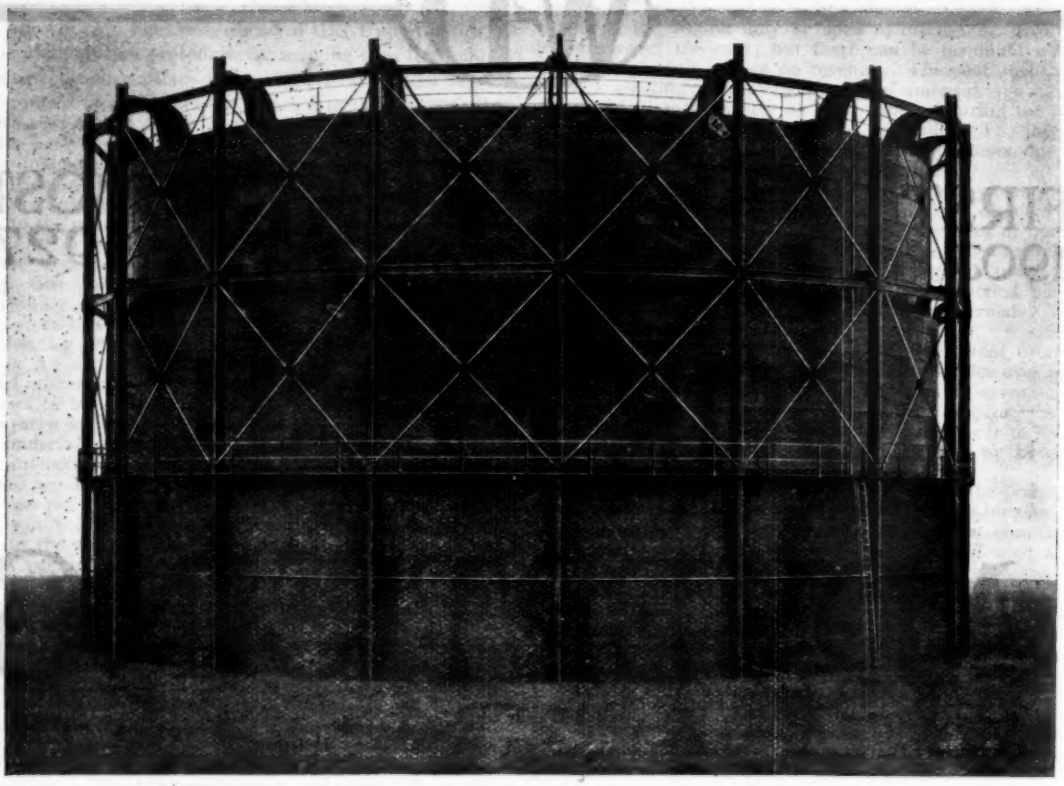
FIRST
1903

FOREMOST
1927

OUR BEST ADVERTISING MEDIUMS

SERVICE & DEVELOPMENT

The WOODALL-DUCKHAM VERTICAL RETORT & OVEN CONSTRUCTION CO.,(1920) LTD.



Just Completed!

—at Uxbridge.

THE illustration shows a joist-guided Gasholder, with a capacity of quarter-of-a-million cubic feet, built by us at Uxbridge

Built during the period of the prolonged stoppage with all its attendant difficulties, was completed "on time," and immediately put into successful operation.

Increased facilities and our long experience in the design and construction of Gasholders of all types and sizes enable us to offer you important advantages, and we shall be glad to submit detailed specifications, design, and quotations.

Robert DEMPSTER & Sons Ltd
ROSEMOUNT IRONWORKS
ELLAND
YORKS. ENG.

'PHONE: 261 ELLAND.

TELEGRAMS: "DEMPSTER, ELLAND."

another feature is worse. The assessment for income-tax is based on profit actually earned, and if there are no profits there is no tax. But the rates, though also claimed as based on profit, are collected without reference thereto. A landlord does not pay rates on an empty house; but even if the gas undertaking has nothing for the shareholders, the rate collector will stand out for his pound of flesh. There are no instances on record of reductions being allowed in the war years, in 1921, or in 1926, or of re-valuations based on earnings during those periods.

Modern experiences show that a fair valuation cannot be based on a short term; yet there is a tendency to select (say) not more than three prosperous years for that purpose. The expression "over a term of years," should include fourteen, and preferably twenty-one. This point is met to some extent by quinquennial valuations.

THERMAL REQUIREMENTS OF THE CARBONIZATION PROCESS.

A long article appeared in "Das Gas- und Wasserfach," in the issues for Jan. 1, 8, 15, and 22, by Ernst Terres and Heinrich Wolters, describing researches carried out at the Brunswick Technical University on the subject of the heat required for the coking of gas and coking coals. The investigations were undertaken with a view to obtaining some enlightenment on the theory of retort and oven firing. In their introduction, the authors explain the term "coking heat," by which they describe the heat requirements for coking a given quantity of coal. By it, they understand a quantity of heat, expressed in calories, which is used in converting one kilogramme of dry coal at 20° C. into coke at any given temperature, reckoned on coke, liquor, and liquid tar at 20° C., and including the energy in calories which is represented by the gaseous products of carbonization. It might therefore be termed a gross coking heat. They regard as normal the value obtained for the coking process at 1000° C. They compare their standard with that of others who have made investigations on similar subjects, and point out the advantage which would accrue from an exact method of ascertaining the heat requirements of any particular coal.

Apparatus Employed.

A special form of apparatus was devised, which is described and illustrated in the article. It consists in a coking receptacle proper, which is made of quartz, and is built into a bronze bomb. The quartz receptacle terminates at the lower end in tube form, which provides an outlet for the volatile products of combustion. The cover has a deep tube-like recess which projects into the coal in the receptacle, so that, by means of it, an insulated thermo-element can be kept in the midst of the coking mass during the process. The quartz receptacle is electrically heated by external current, and the bomb containing it is situated within a large calorimeter, while the volatile products pass through another calorimeter, in which their calorific value is ascertained. By careful insulation in the bomb, it was found possible to effect a heating of the quartz receptacle up to temperatures of 600° to 1100° with an efficiency of 80 p.ct. of the total heat employed; only some 20 p.ct. straying to the surrounding calorimeter. In the determinations, the coking heat of any coal is given by that proportion of the heat supplied which is found, from experimental data, to be contained in the coke at 600° C., *plus* the estimated heat contents of the coke between 600° C. and whatever higher temperature is desired, *plus* the experimentally determined heat contents of the volatile products. The heat of any exothermal or endothermal reactions due to the coking process does not affect the method of calculation employed, and has no influence on the final result.

Specific Heat and Coking Temperature.

In the course of the main investigations, the specific heats of various semi-cokes were determined, and it was found that, the lower the coking temperature, the greater was the specific heat of the semi-coke. Values for the coking heat were determined for six different coals, two of which were typical gas coals, two typical coking coals, and the other two somewhere between. Results showed striking variations in the matter of the heat required for coking them at various temperatures. A gas coal "Teutoburgia" and a coking coal "Zollverein" showed parallel increases of coking heat with rising temperatures, the latter throughout being only 10 to 15 calories per kilo. of coal below the former. Above 1000° C., however, the "Zolliverein" had an abnormally high coking heat value. In the curves for three other coals, each had a minimum value somewhere between 800° and 900°, but each at a different temperature. At 1000° all these five coals had about the same coking heat value—viz., 400 to 420 calories per kilo. of dry coal (720 to 756 B.Th.U. per lb.). Another coking coal called "Präsident" was exceptional. Coking heat values showed a regular increase with increasing temperatures up to about 850°. Thereafter, to about 1050°, the value remained constant at about 340 calories per kilo. Above this temperature, it began to rise again.

Relationship Determined by Exothermal Reactions.

The variations in the value for different temperatures in the various coals suggested that the relationship is probably determined by exothermal reactions. In this connection, the coals were examined by comparing the readings of the thermometers of the electric furnace and of the coking mass during the coking process. Only one of the coals showed no exothermal reactions of dissociation; the others showed them in varying degrees. No satisfactory explanation of the minimum value could be found; the course of the carbonization at various temperatures appears to play an important part.

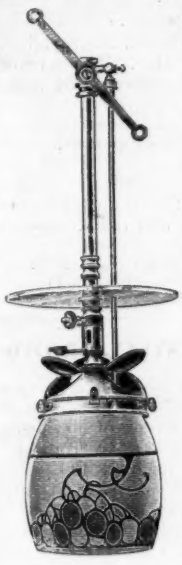
The results obtained in these investigations indicate, in the opinion of the authors, that they may lead to a method of classifying coals quite different from any hitherto considered. The principal value of the researches lies in any new light they may shed on the firing requirements and the capabilities of gas-works carbonizing plant and of coke-ovens. The work is being continued.

THE "DISCUS" DIFFUSER.

[*Patent applied for.*]

While the question of maintenance is occupying such an important place in the deliberations of the gas industry, it is gratifying to find that the manufacturers of fittings and appliances are making an effort to overcome some of the difficulties.

We have had brought to our notice a simple contrivance which has been invented to prevent the corrosion and discoloration associated with the use of the inverted burner. Often the metal work of the pendant or bracket immediately over the burner becomes discoloured, due to the products of combustion. This discoloration, while bad from an æsthetic point of view, is more than merely an eyesore; the products attack the metal, and in time exert a deleterious effect.



The device, which has been named the "Discus" diffuser, is in the form of a disc of English glass, and is intended to be fitted immediately above the burner. The rising products are diverted by the "Discus" from the fitting, with the result that the metal work over the burner retains its original colour and freshness. The device is simple, is easily fixed, and is applicable to almost every design of pendant or bracket. It does not detract in any way from the appearance of the fitting.

It will be found that, if the glass becomes discoloured, it can be readily cleaned with a damp leather or duster; the disc being loose, and so fitted that it is easily rotated for the purpose. We are informed that, notwithstanding the fact that the diffuser was not placed on the market until this year, it has already been taken up in large numbers by many gas undertakings.

The makers of the "Discus" are Messrs. Arthur Raybould, Ltd., Britannia Works, Fleet Street, Birmingham; and the same firm have been experimenting for some time with a view to the utilization of a non-corrosive metal for the manufacture of gas fittings. There are, however, so many factors to be considered—such as cost, method of manufacture, and appearance—that no tangible result has been arrived at.

They claim, however, that they have made a great advance with their non-corrosive "Auto" burner which was introduced to the trade at the National Gas Exhibition in 1923, and is still being used in large quantities by gas undertakings for automatic installations.

A striking proof of the strength and durability of this burner has recently been brought to our notice. A number, having been brought in from the district after several years' wear, were returned to the makers to be made fit for re-issue. This was done at a trifling cost, and the burners were returned as good as new.

Wills.—Mr. Daniel Irving, of Bristol, who died at the age of 71, left estate of the gross value of £23,869, with net personalty £18,105. The will of Mr. H. B. Heath, for many years an official of the Plymouth Gas Company, has been proved at £4271 gross, with £2364 net personalty. Probate has been granted to his widow as sole executrix.

BRITISH INDUSTRIES FAIR.

THE WHITE CITY, LONDON.

The popularity of the London Section of the British Industries Fair, which is staged at the White City, Shepherd's Bush, is undoubtedly growing; and the general public, as well as the trade buyers, are enthusiastic in their praise of it. In exhibitions of this kind, the comfort of the visitors has a great deal to do with their appreciation of the various exhibits; and this is ensured at the White City. It was last year that the responsible authorities decided to use gas for heating the entire building; and such was the success that there was no hesitation about employing gas again this year, not only for heating, but also for cooking. This applies to both the London and the Birmingham Section of the Fair. In the kitchens at Birmingham, more than seventy gas cookers and grillers are in use, as well as fourteen gas-heated vegetable boilers and twelve gas-heated appliances for supplying boiling water. At the White City, there are 58 gas radiators and no fewer than 380 gas fires.

GAS LIGHT AND COKE COMPANY.

There are two entrances to the White City, and at each the Gas Light and Coke Company have decorative pylons complete with most attractive fires. They serve not only to show the fires in a pleasing manner, but also to give the public some idea of the Company's showroom work. Above the fires are painted slides of views of the interior of the Company's showrooms at Kensington, Walham Green, and Golders Green. The slides on each pylon form a square box which is illuminated from the interior; and the result, as can be imagined, is excellent. The effect of the Company's stand also is excellent. A barrel of tar is the centre of a revolving table on which are set out various dyes and other products, such as naphthalene. The lighting is by Sugg directive and ventilating lamps, and is beyond criticism. Round the walls of the stand are photographs of the Royal visit to Beckton last year.

SOUTH METROPOLITAN GAS COMPANY.

The lighting of the exhibit staged by the South Metropolitan Gas Company is different, but equally effective. The scheme is carried out by inverted burners fitted with enclosed silica globes and attractive silk shades; and each light is switch controlled. The exhibit itself takes the form of an old wayside inn. If the visitors to the Exhibition are disappointed when they discover that what looks like a barrel of beer is really a cask of creosote, their disappointment is short-lived, for there is abundant interest in the display. The path to the doorway of the inn is paved with "Metro" tar paving, and the woodwork of the inn itself is treated with "Metro" creosote. The interior has a most inviting appearance, thanks to a "Metro" log fire, which consumes only 0·25 therm per hour. During her visit to the White City last year, H.M. the Queen was highly interested in the exhibit of the "South Met.;" and this year the stand is similar, though not identical.

It is interesting that the whole of the White City is disinfected by "Metro" disinfectant fluid, which has five outstanding features: It is four times as powerful in its action as pure carbolic acid when tested against a vigorous culture of B typhosus; it mixes easily with water to form a rich milky emulsion; it flows freely at all temperatures, and can be admixed with cold or hot water; hard water, or even sea water, may be used for dilution; and, finally, it contains no caustic alkali.

IMPERIAL CHEMICAL INDUSTRIES.

The central stand in the chemical section of the Fair is that of Imperial Chemical Industries, Ltd. This occasion is the Combine's first appearance in public; and the novel exhibit fittingly symbolizes the world-wide scope and enormous interest of the new merger. The products of each of the four Companies—Brunner Mond; Nobel Industries; United Alkali; and the British Dyestuffs Corporation—are allotted separate sections on the stand; and a further section demonstrates the co-relationship and inter-linking of the various products and processes of the four constituent firms. This is done by an ingenious arrangement of models and raw materials, with lines of coloured wire directing the eye through a range of processes and intermediate products down to the final products. Thus a chunk of coal is linked to a gaily-coloured dress, and a piece of pyrites to a stick of dynamite.

Associated with Imperial Chemical Industries is Nitram, Ltd., the newly-formed Company who are acting as sole agents not only for the British Sulphate of Ammonia Federation, but also for other fertilizers. The Nitram section of the stand indicates how fertilizers enter into our daily life.

GASEOUS HEAT FOR COOLING PURPOSES.

The foregoing are the exhibits of particular interest to the gas industry. In what may be termed the household section of the Fair, however, several firms exhibit refrigerators. The Ice Stove Company, Ltd., of Victoria Station House, S.W. 1, are showing their "Ice Stove" portable refrigerator. The appliance is very simple, consisting only of boiler and condenser. The boiler is heated for 45 minutes by gas, while the condenser is kept in water. The apparatus will then function as a refrigerating unit for 24 hours. The firm also supply an automatic unit. Electrolux, Ltd., of Regent Street, W. 1, are showing their "Electrolux" refrigerator, which has been described fully in the "JOURNAL," and which needs only a small consumption of gas.

The Fair, which opened on Feb. 21, closes on Friday next.

CASTLE BROMWICH, BIRMINGHAM.

As was stated last week, the heavy section of the British Industries Fair at Castle Bromwich, Birmingham, opened under the most auspicious circumstances, and on a note of optimism. The attendance of buyers from overseas, and also from this country, has been in excess of former years from the first week of the Fair. The number of official delegations of trade and professional organizations has been larger than on any previous occasion. The Premier (Mr. Stanley Baldwin) lunched on Thursday with the members of the Council of the Chamber of Commerce and the Fair Committee. The Council of the Society of British Gas Industries were represented at this function; those present including the Chairman (Mr. F. J. Gould), Mr. R. B. Hobson, and the Secretary (Mr. Arthur L. Griffith). They made a tour of the Fair, and were joined by Mr. A. W. Smith (General Manager of the Birmingham Gas Department) and Mr. R. G. Rogers (Superintendent of the Fittings Department).

Messrs. Gibbons Bros., Ltd., of Dudley, have an interesting exhibit, the chief feature of which is a water-sealed annealing muffle (working) for the clean annealing of non-ferrous metals in wire or laps, and small metal stampings and pressings. The muffle is fitted with Gibbons patented hoods and driving mechanism, and is fired by town gas. An office in the centre of the stand is made of brickwork, to demonstrate the quality of the bricklaying as done in furnace work and gas retort settings. Refractory materials are also shown on the stand.

The New Conveyor Company, Ltd., of Smethwick, exhibit a model showing various types of their conveying and elevating plant; special features being the fitting of ball bearings to reduce the amount of driving power required.

The "Minerva" heater and warm air circulator (an illustrated description of which appeared in the "GAS SALESMAN" for Dec. 29, 1926) is shown by Messrs. William Grice & Sons, Ltd., of Fazeley Street, Birmingham.

Messrs. Cochran & Co. (Annan), Ltd., exhibit under steam (in the Steam Power Section) one of their smaller size patent vertical boilers.

The British Thomson-Houston Company, of Rugby (who are manufacturers of motor and turbine driven gas blowers), show electric motors of a new type for industrial drives.

Messrs. Hunt & Mitton, Ltd., of Oozells Street North, Birmingham, exhibit a full range of engine and boiler mountings, together with their latest developments in valves and other specialities.

Silas Hyde, of Birmingham, shows gas heated japanning and enamelling stoves.

Messrs. G. B. Parkes, Ltd., of Halesowen, have on view a collection of malleable iron tube fittings for gas, &c.

Leonard Procter, of Sparkbrook, Birmingham, exhibits his patent interchangeable valve, which can be used at any angle, thus obviating the expense and time required for making special valves.

Stewarts & Lloyds, Ltd., show a variety of lapwelded wrought iron, steel, and weldless steel tubes and fittings, with joints to suit every condition of service; also "Victaulic" joint tubes.

British Arca Regulators show apparatus for the control of pressure (high and low), temperature, humidity, level, &c.

The Lea Recorder Company, Ltd., of Manchester, show coal meters for measuring coal consumed on chain grates and other mechanical stokers, and their "Cubi-Meters" for coal measurement in bulk for gas-works, boiler-houses, &c.

Messrs. George Kent, Ltd., of Luton, among other exhibits show their Venturi gas meters for various purposes.

The Camelon Iron Company, Ltd., of Falkirk, have a wide selection of grates, one of which is fitted with their alternative gas or coal oven.

The Carlton Pipe Joint Company, Ltd., of Sheffield. This firm exhibit their "Carlton" joint, suitable for steel or cast iron pipes. The joint is on the ball and socket principle, is leak-proof, and in construction is such that it allows the maximum amount of movement in any direction. Skilled labour is not necessary when jointing.

On the Falkirk Iron Company's stand is the "Smoothtop" series of gas cookers, the high standard of which is generally

recognized. There are also a few tasteful designs of gas mantel register grates suitable for bedrooms.

The "Slaxon" gas coppers (on the stand of Messrs. Henry Slack & Sons, of Accrington) claim attention. One of these, of 10-gallons capacity, has a 24-gauge galvanized sheet steel outer case with top and hinged lid. The copper pan is tinned on the inside, and the condenser is of copper.

The Bromford Tube Company, Ltd., of Birmingham, exhibit weldless steel boiler tubes, stay tubes, superheater tubes, steam mains, weldless steel gas mains, high-pressure tubing, loose flanged tubes, and specimens of metallized tubing.

On the stand of Messrs. Geo. Bray & Co., Ltd., of Leeds, is to be seen a comprehensive range of incandescent gas burners for home, church, shop lighting, &c., and several patterns of

Bray's No. 790D Burner, showing Diffuser.

burners for street lighting. The domestic burner (No. 790D pattern) is probably the most popular of all the firm's inverted burners, for not only have the public favoured it, but gas companies have adopted it widely for maintenance work. A useful cluster burner for church lighting, or other purposes where the fittings are for upright burners, is provided by the No. 100 pattern. This is a three-light bijou cluster, of first-rate efficiency. A single-light bijou burner is mainly used for landings, bathrooms, or small bedrooms, and is supplied with bracket-back, or without, as desired. This burner and bracket-back is in a nickel-plated finish.

In Exhibition Hall "A" (in which several firms are using gas for boiling rings, &c., though not in the gas industry) the following have stands:

Light Castings, Ltd., Audenshaw, Manchester.—Two gas fires on one stand; and one gas fire on a second stand.

John Harper & Co.—Small display of radiators.

John Smith, Ltd.—Peter Pan burners.

Carron Company.—Gas fires, &c.

A. Bell & Co., Ltd., and Bell Range and Foundry Company, Northampton.—A "Bell" furnace gas fire with no visible metal work.

Morris & Wilkinson, Burnley.—Wash boilers for housing schemes. The effective use of the "Beatall" gas oven is also demonstrated.

National Gas Engine Company.—Using gas for three engines.

Crossley Gas Engine Company and Fielding & Platt.—Using gas for ignition tubes only.

Hurry Water Heater Company, of Birmingham.—Gas heated domestic hot water appliances.

Taylor & Challon, Ltd., of Birmingham.—Using gas for chemical vats.

Monometer Manufacturing Company, of London.—Furnace.

British Mantle Company, of Manchester.—Small display of "Peter Pan" lights.

Tilley Lamp Company, of Brent Works, Hendon.—Low-pressure gas soldering stove.

Tennant & Co., of Warrington.—Fuel radiants for gas fires.

Thomas & Bishop, Ltd., of Birmingham.—Results of recent researches in refractory cements.

Harper & Moores, Ltd., of Stourbridge.—Refractory materials.

Payne & Griffiths, of Birmingham.—Gas pressure gauges, and a series of regulating and reducing valves and regulators.

Exhibition Hall "A" is lighted by means of 65 1000-C.P. Tilley high-pressure lamps; the main entrance being illuminated by a 4500-C.P. lamp.

In Building "B" and part of Building "C" Extension the overhead lighting is by 70 high-pressure 1000 C.P. gas lamps, which are supplied from two 4000 c.ft. per hour Bryan Donkin compressors, run alternately.

The roadway inside the exhibition grounds is illumined by means of ten 6-light low pressure lamps. Gas is used by forty exhibitors for various purposes on their stands. Over 3 miles of gas supply pipes have been installed for lighting, heating, and power.

WEIGHING MACHINES FOR GAS-WORKS.

Points to Bear in Mind.

In selecting the make of a weighbridge, one is perhaps misled into thinking that attention to the detail of the mechanism employed does not matter, as any machine must be all right if it carries the stamp of the Weights and Measures Department, denoting the hall-mark of accuracy. It must be remembered, however, that the durability of this accuracy is dependent on many factors not apparent to the unwary purchaser. Regarding this, several pamphlets have been published by Messrs. Saml. Denison & Son, Ltd., of Leeds (London address, 28, Victoria Street, S.W. 1), the sole makers of the well-known Blake-Denison weighing machines; and a few points from these booklets are well worthy of publication here, as being of general interest.

CONCERNING "DENISON" KNIFE-EDGES.

All weighbridges have parts which must suffer wear, and thus need replacing. A maker of reputed experience will so position these wearing parts that each may be readily replaced at a minimum of cost and inconvenience. Knife-edges are the vulnerable part of a weighbridge, and their condition is vital to accuracy. The "Denison" interchangeable knife-edge has a peculiar contour which eliminates any tolerance on vital dimensions, and ensures definition and security without the use of bolts. The wedge knife-edge centre is made to withstand vibration, and is accurately located by the mere act of driving it into a specially-prepared gutter. It is, of course, not only wear, but rust, which ruins knife-edges. To counteract this, Messrs. Denison patented a method of coating the knife-edges and bearings electrically with a special metal which resists damp and acids. Another feature of the "Denison" weighbridge is that self-aligning bearings ensure even distribution of the load along the knife-edges. The wearing parts of each unit have been isolated, standardized, and made renewable. Both steelyards and minor poise bars have duplicated graduation, and are reversible.

SELECTING A WEIGHBRIDGE.

It is, of course, a simple matter to settle whether one's needs are confined to road or to railway traffic, or if there are both. If the road traffic involves motor haulage, it is not advisable to select a table less than 8 ft. in width by at least 18 ft. long, though 20 ft. is modern practice. The capacity should be 15 or 20 tons. With railway traffic, the table should not be less than 16 ft. in length, and should have a weighing capacity of at least 30 tons. It may be that a locomotive having a short wheel base will pass over it; and a weighbridge suitable to carry this load must be installed. To accommodate traffic involving both rail and road haulage, Messrs. Denison make a machine provided with rails sunk flush with the table surface. It may be that some portion of the rail traffic does not require to be weighed, in which case a double track type may be useful. The two tracks need only be about 6 in. apart.

AUTOMATIC WEIGHING.

The importance of being able accurately to weigh and record coal or coke passing along a conveyor need not be dwelt upon. The principle of the Blake-Denison machine for this purpose is that of suspending a short section of the conveyor and of weighing the material as it passes over it—without stopping. Thus, if the section is 10 ft. long, the machine will weigh and record the weight of the material every time the conveyor travels 10 ft., with a maximum error of within ½ p.ct. The distance apart of the suspension varies with that of the speed of the conveyor. On one running at 240 ft. per minute, the suspensions would be 20 ft. apart. The weighing machine is driven by the conveyor itself, by the returning belt, so that it is not deranged by any variations in speed. The recorder is automatic in action, is operated electrically at any distance from the weigher, and produces a permanent "time tonnage record," which, besides furnishing valuable information of output of the installation, and enabling the supply of material to be regulated, checks any inattention on the part of the workers.

AUTOMATIC TELPHER WEIGHER.

This weighing machine automatically aggregates upon a reliable recorder the net weight of material carried by the telpher grab or skip, which is wholly supported by the suspended length of track for a few seconds. The length of the weighing rail is determined by the speed of the traveller. The tare weight of the telpher grab or skip is balanced by a special poise weight, so that the load shown is net material. Messrs. Denison also manufacture weighers and recorders which automatically aggregate the weights of trucks while slowly travelling over a weighbridge.

MIDLAND JUNIOR GAS ASSOCIATION.

An interesting paper on the subject of "Drainage and Effluents from Gas-Works" was read by Mr. Edgar Jones, of Derby, at a well-attended meeting of the Association at the Birmingham Council House on Thursday, Feb. 17.

DRAINAGE AND EFFLUENTS FROM GAS-WORKS.

By Edgar Jones, of Derby.

[Extract.]

The following figures relating to the toxicities of some of the substances which occur in tar and ammoniacal liquor have been obtained by the Standing Committee of River Pollutions, in conjunction with others. Phenols have been found toxic to fish at a dilution of one part in 100,000; lime at one part in 2000 but not at one in 10,000. One part of ammonia in 100,000 is injurious, but one part in 250,000 is not. The salts of ammonia, such as chloride, sulphate, sulphide, and carbonate, are fatal at a concentration of one part in 1000. Cyanides are the worst substances, for one part in 1,000,000, which is beyond the limit which chemical skill can detect by the usual reactions, is fatal; but sulphocyanide is less poisonous, for carp survived for four hours in a solution of one in 1000, but died on immersion for 24 hours.

Different types of fish are affected in different ways. It has been shown that, though carp will exist for four hours in a solution of sulphocyanide at a dilution of one part in 1000, gudgeon are killed very quickly in a solution of one part in 10,000 of ammonium sulphocyanide. On the other hand, dace are not affected.

Aniline and toluidine are toxic at one part in 10,000, but pyridine at the same dilution is innocuous. Naphthalene is not injurious at one part in 1000.

Drainage Experience at Derby.

Our experience of drainage has been varied; for in two of our works at Derby, brooks flow directly under the works, and drains are connected to them. Consequently, a large amount of water and drainage examination has been done to trace the causes of contamination, and to prevent them as far as possible.

Into one of our stations, where most of the contaminations has occurred, the brook course is culverted, and flows from a large engineering works. Another drain crosses our works, and joins the brook course. After this drain leaves one section of our works, another big drain from the engineering works enters. The combined drain then passes under a canal, to come out as an open drain in another section of the works, where it receives the drainage from that section, which contains the tar and ammonia plants. After it has passed this sections of the works, it drains fields for about one mile, and then enters the river. This drain also receives the washings from a large tip, and naturally receives some very peculiar substances in solution. To give an idea of the original state of this drain, I append figures of the oxygen absorbed, &c., at various points along it, to show how the drainage into it led to identify the particular contaminations which were most objectionable.

—	Total Solids.	N as NO_3.	Parts per 100,000.			O_2 Absorbed. 4 Hours at 27° C.
			Saline NH_3.	Albuminoid NH_3.	Tar Acids.	
A—Sample taken as drain entered gas-works	34·00	0·05	0·292	0·080	0·063	0·145
B—Sample from main culvert after entry of first drain	40·88	0·10	1·496	0·181	0·053.	0·520
C—Sample from main culvert after entry of second drain	54·80	0·10	0·996	0·179	0·028	0·684
D—Sample after admission of water from last drain—*i.e.*, tar and ammonia plants . .	55·12	0·10	1·109	0·208	0·030	0·730

Several other instances will show the problems which have further confronted us. In one case, just where the culvert entered our works, a large quantity of tar was reported. This appeared strange, for tar is naturally associated with gas-works. Of course, the onus was placed upon us. Our tar plant, however, was on the other side of the canal; but there was an oil gas plant near. The analysis, however, showed a dehydrated coal tar. This was curious; and as we could not conceive that dehydrated tar passed beneath the canal, we were obliged to leave the matter to develop. Some time later we heard that a certain amount of dehydrated tar had been lost from another works whose drain ran into ours.

Another case was that of a drain discharging water smelling strongly of sulphuretted hydrogen. The water resembled the sulphur springs in Yorkshire. It was found, on tracing the drain to its source, that the presence of sulphur in the water was due to rain water percolating through new clinkers. The latter were not in any way connected with our works. The most persistent causes which absorb the oxygen from the water seem to be coal dust and water which has been in contact with clean gas. Rain which has percolated through a coal stack in the open air readily absorbs oxygen from permanganate of potash, and would do so from natural water. The removal of the coal dust by settling and filtration is not a difficult matter when there is sufficient natural head to allow for an impedance in the flow of the stream. Our difficulties arise because there is so little natural head on the drain; but it is hoped to overcome this.

The overflow from gasholders, and drainings from a naphthalene washer (which give an oxygen absorption up to 10 parts per 100,000) cause most contamination; but these in our case can be sufficiently diluted by the use of an overflow of cheap water, which can be readily obtained. The drainage from the chemical plants was a serious one; but this drain, which ran alongside a tip, has now been placed in a concrete course, with sumps containing a dividing board and filled with clinkers so that all the water has to pass first downwards, and then upwards, through clinkers, to remove suspended matter.

It seemed impossible to obviate oily matter on the surface of the water entering the drain; for this oil was not held back by the clinkers. Some of the sumps were therefore filled with wood wool held down by weighted purifier grids. This method of removing the oil has been very successful; and the putrescible and toxic matter passing out of the drain has been reduced by 75 p.ct. or more; and the water is an exceedingly good colour.

Effluents from Ammonia Plants.

Local authorities may receive the effluent from ammonia plants into their sewers if it is at a temperature not exceeding 110° Fahr., is not likely to interfere with the sewage works, or is in reasonable proportion to the ordinary sewage. Parrish states that where the volume of spent liquor is not in excess of 0·5 p.ct. of the total sewage, exception is rarely taken to its discharge. The presence of the effluent is welcomed when the nature of the sewage is at all acid with strong acids, for I understand that bacteria beds work better if maintained slightly alkaline. If, therefore, the local health authorities are willing to take the effluent into their sewage system, all that remains to be done is to remove the lime sludge and to cool the spent liquor to below 110° Fahr.

Cooling Spent Liquor.

The question of cooling the spent liquor and settling the sludge can only be decided at the place where these substances are produced; and if it is not desired to utilize the heat from the liquor to preheat water, or to use a water cooler, the simplest method is to employ large settling tanks fitted with baffle walls. In connection with our plant at Derby, we have constructed two tanks side by side, which are made of concrete blocks and are fitted with a number of baffle walls. Each tank is capable of holding ten days' make of effluent; and so the flow through each tank is reduced to a very slow rate, to allow the total solids to settle thoroughly. On leaving the settling tank, the effluent passes through several layers of clinkers held between baffle walls, in case any of the spent lime should not have settled out. It then flows to the main sewer for the town, which passes near the settling tanks. These tanks do their work most effectually; and the average temperature of the effluent leaving them is never more than about 70° Fahr. The suspended matter averages four parts per 100,000. If, however, space is not available for such large tanks for combined cooling and settling purposes, recourse must be made to one of the various types of coolers or preheaters on the market.

The liquid effluent freed from lime is exceptionally toxic; and if the quantity is in excess of that which the Public Health Authorities will take in their sewers, then its disposal is likely to cause anxiety to the manufacturers concerned. I hope that soon a system of purification of coal gas may be devised whereby the necessity of producing toxic effluents of the usual character will be done away with; but while there are effluents to deal with which require rendering innocuous, they must be treated in the most efficient way, utilizing the smallest amount of capital and requiring little upkeep.

Objectionable Constituents of Ammoniacal Liquor.

The acidic and objectionable constituents of ammoniacal liquor are chiefly present in the form of sulphides, ferrocyanides, sulphocyanides, thiosulphate, phenol, and the higher phenols. Dr. Lewis Bailey has shown how the distribution of these constituents varies in liquors from different types of carbonizing plant, and also how the distribution of sulphur varies in liquors which are stored for some time. He has shown how oxidation products are formed when air is mixed

with the gas and passed through the liquid purifying train. These products are highly objectionable in an effluent which has to be treated on the works.

In spent liquor there should be no trace of sulphuretted hydrogen; but even then the figure for oxygen absorbed (four hours at 27° C.), which is an indication of putrescible and toxic matter, may reach the total of 2000 parts per 100,000.

Phenol.

Weight for weight, phenol requires for its oxidation more than twice the amount of oxygen required by sulphocyanide or thiosulphate. Phenol is usually present in much larger proportions than either of the other constituents, and so it seems that a pre-treatment of ammoniacal liquor to recover the phenols would be a most suitable method of reducing the toxicity of the effluent, and also making the treatment of the effluent, if not a paying proposition, at least a less expensive one. According to Skirrow, the amount of phenol lost in ammoniacal liquor is about half that produced during carbonization; and this result I have confirmed in our own liquors. The usual amount of phenol in our ammoniacal liquor is between 0·3 and 0·4 gramme per 100 c.c., which represents on our annual make of liquor about fifty tons.

In sulphate of ammonia plants, the devil liquor and devil oils contain approximately 50 p.ct. of the phenol present in the ammoniacal liquor distilled. The effluent is thereby considerably improved if these oils are not returned to the still. The common practice of returning them to the still is to be deprecated, for they constitute a valuable product.

The composition of these oils varies considerably according to the nature of the liquor distilled and probably to the condition of the saturator. Most people like to dispose of the oils without trouble, on account of the objectionable smell, which is due chiefly to hydrocyanic acid. This gas may be removed, however, by blowing air through the oils, and passing it along the foul gas main if oxide purification is in use, or, if not, through an alkaline spent oxide trap. The oils are then unobjectionable to handle, and may be passed to the tar plant for further treatment, or sold as they are. The oils which settle out from concentrated ammonia may be collected for disposal in a similar manner.

Several methods have been proposed for pre-treatment of the liquor, notable among which is the method of removing the phenols with a suitable solvent such as benzole. The latter is then either distilled to recover the phenol and to render the benzole fit for use again, or it is washed with caustic soda to remove tar acid, and then with acids to remove tar bases.

Removal of Phenol from Ammoniacal Liquor.

It may perhaps be of interest to consider a little more closely from published particulars the removal of phenol from ammoniacal liquor, as it is one of the most sensible propositions yet put forward for the purification of effluents which at the same time will yield (according to those who are working it) a definite profit. The experimental work done in our laboratories prior to the publication of these particulars is confirmed in both Germany and America, though the proposed mechanical details of the process vary. This process had been worked out with a view to its being utilized if occasion arose; but the necessity for its practical application in large-scale manufacture has not yet arisen.

The process for extraction of phenols from ammoniacal liquor in Germany has been installed by Messrs. Henschel & Sons, of Hattingen; their liquor containing about 0·3 p.ct. of phenol. The results were at first disappointing, as only 30 to 40 p.ct. of the phenol was removed; but after fixing centrifugal mixing pumps, and mixing the liquor and benzole at a temperature of 65° C., the percentage recently recovered amounted to about 80. The residue of phenol which is left in the liquor is about 0·07 p.ct.; and the inventors state that this is reduced in passing through the plant. Of the residue, the lime sludge takes up about 50 p.ct.

The liquor is first passed through a coke filter, to remove particles of tar. After this it goes through a preheater, where it is heated by the vapours leaving the benzole still. It then passes through a centrifugal mixing pump, where it is agitated with benzole, and then on to a settling tank. It is again agitated with benzole on leaving this settling tank, and is passed to another settling tank. This last wash is with clean benzole; the former one having been with once-used benzole. The ammoniacal liquor now runs straight to the plant, while the benzole passes to a distillation plant, where the majority is distilled off by superheated steam.

Almost complete removal of benzole takes place in this still, and the heat of the benzole given out in condensation is utilized to preheat the ammoniacal liquor. The residue of phenols, with traces of benzole, is run to a receiving tank, from which, as occasion arises, it is passed to a small intermittent still for recovery of the last traces of benzole. The whole process is continuous with the exception of the final distillation; and the inventors claim that it needs no more attention than can be given to it by the man in charge of the sulphate of ammonia plant.

In the other process, which has been developed in America, the ammoniacal liquor passes downwards in series through two large cylindrical tanks, while the benzole passes upwards; the clean benzole meeting the almost dephenolated liquor. The spent benzole is then distributed upwards through a caustic soda chamber, where it is dephenolated. The sodium phenolate is steam-distilled to remove benzole and other impurities such as pyridine bases and naphthalene, and is then carbonated to recover phenols and cresols. In this process provision has to be made for the removal of pyridine, which is extracted from the ammoniacal liquor by the benzole. This is done by the usual method of washing with sulphuric acid.

Experiments have shown me that the removal of phenol and its homologues by benzole extraction is a most suitable method for reducing the toxicity of the effluent from ammonia stills; the oxygen absorption figure of the effluent in some cases being reduced by approximately 20 p.ct. A decided advantage in colour of the effluent is also obtained, as the intensity of the reddish-brown colouration is reduced almost to straw colour.

The Fowler System.

This process cannot be operated without a large amount of ground area—which is not available in all works—and it requires the dilution of the effluent to a low figure for "oxygen absorbed," if the bacteria are to be kept in good fighting trim. The treated effluent can be returned to dilute the new effluent, so that it is unnecessary to use water as a diluent, unless it can be obtained free and without the necessity of pumping.

Bacteria beds for the treatment of effluents do not involve a large capital outlay, and can be constructed from clinkers taken from the boiler house, suitably graded into a heap. There is no necessity for retaining walls. The sprinkling arrangement can be one of those used in ordinary sewage works, or any suitable method for even distribution of the spent liquor can be adopted. Those with mechanical skill could no doubt arrange an apparatus of this type at small cost. The provision of a sump would be necessary to collect the treated effluent for pumping back to dilute the effluents passing to the beds. The bacteria would have to be introduced into the beds by daily treatment with stable urine and pig dung for about a fortnight.

For an average effluent showing an oxygen absorption of about 1000 parts per 100,000 in a 4 hours' test, it would be necessary to dilute it initially with about fifteen times its volume of water before spraying on to the bed; and when the treated liquor showed a purification of 80 p.ct., it could be returned for dilution of the untreated effluent. Rest periods for bacteria are essential; and in most cases it would be necessary to have at least two filters. At the same time, however, I must point out that prolonged rest periods for the bacteria are as objectionable as overwork. It may be taken that the ratio of the rest period to working time should be about four to one; but the best conditions would have to be obtained for each filter. To give some idea of the space required for a filter of this type, the maximum working capacity of a filter about 100 ft. diameter, and from 6 to 8 ft. deep, is about 45 c.ft. of diluted effluent per minute, or 27,000 gallons of undiluted effluent per day. A filter of this size should be thus capable of treating the effluent from a 5-ton per day ammonia still, but would be working at its full capacity, so that it would really be necessary to provide a duplicate filter, or, preferably, two of smaller dimensions.

Dr. Bailey's Process.

A process devised by Dr. Bailey for treatment of effluents consists essentially in blowing flue gases which are acidic in nature through the liquor. The method has been tried out at Hornsey and Leamington with considerable success. The system aims at the removal of phenoloid bodies from the liquor by simple treatment with boiler flue gases at from 90° to 95° C. In one practical arrangement the liquor was admitted at the top of a distributing tower, while the flue gases were injected by steam at the base; the phenols and steam passing away at the top of the tower. Another arrangement is for the flue gases to be injected into the effluent liquor in a trough through which it is made to circulate; the liquor being kept at a temperature of about 90° C. In this case, too, the devil liquor is evaporated separately, and is not mixed with the effluent liquor.

Effluent Purification at Leamington.

Through the kindness of Dr. Lewis Bailey, the Chief Alkali Inspector, and Mr. R. S. Ramsden, the General Manager and Engineer of the Leamington Priors Gas Company, I am able to describe, and give results of, the process used at Leamington.

Two troughs are arranged in a by-pass on to the main flue, and a steam jet pump fixed level with the top of the effluent half way through a settling pit raises the effluent to a pipe which delivers it into the top trough. A blower connected with 2-in. piping to the main flue blows chimney gases through perforations in a pipe into the hot effluent liquor in the trough. The liquor then flows back through a pipe to the settling pits.

The devil liquor is supplied through a sight feed arrangement to the bottom trough, where it is evaporated by the heat of the flue with the assistance of a steam coil. Any excess which has not evaporated flows back by gravity to a separate store tank in the sulphate yard.

The following table has been supplied by Dr. Lewis Bailey, which gives the results obtained in the apparatus just described

It is pointed out that the trough is still on trial, and the tests must therefore be regarded as evidence of the results yielded under the best conditions of working hitherto obtained. Certain modifications are to be introduced; and these, it is hoped, will add to the efficiency of the apparatus.

* *Leamington Priors Gas Company.*

Combined Effect of Cyanide Extractor and Dephenolating Trough in Improving Character of Effluent, August, 1923, to November, 1926.

The devil liquor was not being separated and treated by evaporation on the occasion of any of the tests here recorded. The cyanide extractor was not at work in August, 1923. It was at work in 1924, and has worked ever since that date.	Effluent Liquor from Settling Pits as Originally Discharged August, 1923.	Cyanide Extractor Working, and Dephenolating Trough.		
		Feed Liquor to Trough.	Effluent Liquor from Trough, Nov. 4, 1926.	
			As Sampled. (a)	Corrected for Concentration.* (a) × 0·78.
Rate of flow, gals. per min.	..	6·5	5	..
Appearance	clear, brown	clear, brown	clear, dark brown	..
Temp. of liquor, ° C. . .	..	80	77	..
Temp. of boiler flue, ° C.—				
Inlet end	..	110	..	..
Exit end	..	85	..	..
Analysis, parts per 100—				
Alkalinity, cal. as CaO .	..	0·04	0·025	0·020
Chloride, cal. as HCl .	..	0·293	0·375	0·293
Phenol, cal. as C_6H_5OH	0·183	0·135	0·082	0·064
Thiocyanate, cal. as CNS.	0·300	0·090	0·115	0·090
Thiosulphate, cal. as S.	0·163	0·072	0·067	0·052
Colour-producing bodies (including higher tar acids), cal. as $C_6H_4(OH)_2$	..	0·04	0·025	0·02
Oxygen absorbed, parts per 100,000 (4 hours at 27° C.), calculated as due to—				
Phenol.	325	240	145	113
Thiocyanate	245	75	95	75
Thiosulphate . . .	140	62	57	44
Other forms (including colour-producing bodies), by difference.	85	85	98	76
Found	795	462	395	308
Oxygen absorbed (3 mins. at 27° C.), found. . .	..	393	335	260

Efficiency; Removal of impurities by dephenolating trough, Nov. 4, 1926.

	P.Ct. of Total Entering.
Alkalinity	50
Phenol	53
Thiocyanate	*Nil*
Thiosulphate	28
Other forms	10
Colour-producing bodies	50
Oxygen absorbed—	
4 hours, test 27° C.	33·5
3 mins., ,, ,, ...	33·5

* Chloride in liquor is taken as a fixed standard in calculating contraction factor 0·78

CONCLUSIONS.

If the balance-sheets of various undertakings be considered, it will be seen that rates are usually a large item for which, in the case of a gas-works, very little can be seen in return. Should not then the local authorities be held responsible for the treatment of trade effluents, as these authorities are, or should be, naturally fitted out with the plant for dealing with the objectionable putrescible matter? As, however, the law does not compel local authorities to receive such effluents, the manufacturers must, if necessary, consider the idea of treatment of wastes to obtain the most efficient results with the minimum of capital and working expenses and, if possible, the recovery of valuable commodities from such wastes.

In a paper by Gardiner on the purification of sulphate plant effluents, the conclusions at which he arrives are these:

(1) Avoid as far as possible vertical retort liquor.
(2) Cyanide should certainly be extracted in gas-works plant.
(3) Reduce excess of lime fed into stills, to reduce alkalinity and thus modify colour.
(4) Reduce ammonia in effluent from still, for the same reason.
(5) Settle waste liquor quickly, to reduce lime excess.
(6) Introduce flue gas tower, to reduce phenols.
(7) Finish off with one or two bacterial filters.

All these items subscribe to obtain a pure effluent; but it must also be remembered that the purification of effluents is only a minor consideration, though probably compulsory, when compared with the real object of a gas undertaking, and that, as the treatment of effluent is not productive, it does not behove those concerned to waste more time, money, and energy than are necessary.

The pre-treatment of liquor can be made to pay its own expenses if the phenol content is sufficiently great; and nowadays in most liquors it is, particularly in those from vertical retorts. Dr. Bailey has shown how the oxidation compounds such as thiocyanate, sulphate, and thiosulphate in ammoniacal liquor can be kept low in effluent by not passing the oxygen with the gas through the liquid purifying train, and by working-up the liquors with as short a storage time as possible.

The ideal method of reducing both the toxicity and the quantity of effluent is one which would also simplify the process of purification. I have in mind the fact that more than sufficient sulphur is present in crude gas to combine with all the ammonia to form a fixed salt. Ammonia with sulphuretted hydrogen and sulphur will also extract hydrocyanic acid from the gas, giving ammonium sulphocyanide. If these impurities of the town gas can be removed and converted into saleable products during the process of purification, without the necessity of recovering them and then treating them in separate installations, the bye-products should be produced more cheaply, and also the cost of gas production should be reduced.

By a process of this description the presence of sulphocyanides and thiosulphate in such ammoniacal liquor as was produced would be reduced to a minimum, for the ammonia in the liquor would be returned to the gas stream as soon as possible after production, to assist in the purification. Though there is one such system at work, it cannot be claimed that it is possible for all works to adopt it at the present time; and until such a time arrives, drainage and effluents must be treated, if necessary, according to our best knowledge.

My own recommendation for the treatment of drainage is that of settling first, filtering, and then, if necessary, passing over bacteria beds. The latter should rarely be necessary if the drainage looks good and clear, and the volume is relatively small compared with that of the river or stream into which it runs.

For the treatment of effluents, I should recommend, first, that the findings of the Alkali Inspector be carried out with regard to the admission of air into the purifying system. This means that the liquor, on collection, does not contain so many oxidation compounds, which are so objectionable in effluents. Secondly, I should advise that liquor be worked up as soon as possible after production, and as little exposed to atmospheric oxygen as possible. The third recommendation is that the phenols should be removed by treatment of the liquor prior to distillation. Finally, after removal of the lime sludge, the effluent should be treated upon bacteria beds similar to those in use in sewage works.

Opinions may vary as to the suitability of this type of treatment; but it would, I think, meet most cases where the space is available, and would be less expensive than direct treatment on bacteria beds. The phenol recovery process should at least pay its way; and the load on the bacteria beds would be less. The running costs of the bacteria beds would be less, as, the effluent requiring less oxygen for treatment, less pumping for dilution would be necessary.

My thanks are due to Mr. J. Ferguson Bell, for allowing me to mention particulars concerning our works at Derby, and for the assistance he has given me in the preparation of this paper.

Discussion.

Mr. C. F. TOOBY (President), in proposing a vote of thanks to Mr. Jones, said that the disposal of effluent from sulphate plants was becoming increasingly difficult in many places. Thus the paper giving the results of Mr. Jones's experience and investigation was a most valuable contribution, and would doubtless be read with interest throughout the gas industry. Mr. Jones had dealt very thoroughly with the various factors in the process of gas manufacture which influenced the question of oxygen absorption of the effluent liquor, and the precautions which could be taken to reduce that factor. At Coventry, on the new vertical retort plant, a tar extractor was being installed in the retort house, and arrangements were being made for the circulation in the mains of liquor containing very little free ammonia. The tar and liquor made would be kept apart as far as possible. By this means some improvement in the liquor would be obtained. Such methods, however, while they helped a little, were insufficient; and, as he mentioned in his Presidential Address, large bacteria beds were being installed at the Foleshill Gas-Works for treatment of effluent liquor before admission to the sewers. He would like to know what was the exact cause of the frothing of spent liquor. His opinion was that sewage authorities should be prepared to treat sulphate effluent along with sewage. They paid rates for that kind of service; and gas undertakings ought not to be expected to provide their own plants at the gas-works, for gas was essential to the life of the community.

Mr. W. MACNAUGHTON (Wolverhampton), in seconding the vote of thanks, inquired what was the oxygen absorption figure at the inlet and outlet of the settling tanks. He observed that at Leamington they got an efficiency of 33·5 p.ct., but in their own case at Wolverhampton they were required to have an efficiency of 90 p.ct. before the sewage authorities would have the effluent. What was the difference in oxygen absorption between the vertical and horizontal retort liquor?

Mr. EVANS inquired what the author thought as to the time of the rest period for the bacteria beds. He added that at the works with which he was connected an improved result was obtained by separating the devil liquor instead of putting it through the still as they did formerly.

Mr. C. F. W. RENDLE (Redditch) shared the view that local authorities should deal with gas-works effluent to a greater extent than they did at present. Regarding phenols, it seemed that the most sensible course was to deal with them effectively at the start.

Mr. SMITH observed that at the works with which he was associated they were making a start on the evaporation of the devil liquor.

Already they were evaporating 50 to 75 p.ct.; and when they got to the stage of total evaporation, the improvement effected would be considerable. Then, with the other modifications, it was anticipated that the oxygen absorption figure would be substantially reduced.

Mr. JONES, in reply, expressed the opinion that frothing of the liquor was probably due to alkalinity, or to the presence of tar acids or oil. In his own experience there was no difference in the oxygen absorption figure at the inlet and outlet of the settling tanks. As to the resting period of the bacteria beds, he was not prepared to give a definite answer, because so much depended upon the system in use. The best conditions must be found on the spot.

YORKSHIRE JUNIOR GAS ASSOCIATION.

A Meeting of this Association was held in the Chemical Lecture Theatre of the Leeds Technical College on Feb. 19.

The President (Mr. S. T. S. Musgrove, of Sheffield), introducing the speaker, Mr. T. B. Browne, said the Association were fortunate in securing the services of a representative of the National Gas Engine Company. He was sure the paper would prove most interesting.

POWER FROM TOWN GAS.

By T. B. BROWNE, B.Sc., A.M.Inst.C.E.

By far the largest number of gas engines installed are of the horizontal single-cylinder type working on the four-stroke cycle. These appear to have reached finality in general design, but a number of detailed improvements are still being made. On all engines electric ignition has superseded the hot-tube ignition, as magnetos are considered satisfactory, and need little attention.

Several types of magneto are fitted, such as rotary, semi-rotary, and oscillating. The first-mentioned type is usually fitted to small high-speed engines, and the semi-rotary type to slower engines. Both high-tension and low-tension magnetos are used; the former being fitted to the smaller engines. When low-tension ignition is employed, mechanically operated sparking plugs are fitted.

A recent improvement on the smaller engines is a new type of high-tension magneto, the armature of which has a reciprocating motion. This machine is very simple, and can be readily taken to pieces for cleaning. It is unaffected by damp or oil, which can be poured over it, while the engine is running, without stopping it. Contrary to usual practice, this magneto should be lubricated every day. Unfortunately, it has not yet been adapted for multi-cylinder engines, though experiments are being made.

Throttle governing is used on a larger scale now than formerly, due to the desire for steadier running, though the old cut-out arrangement was far more economical. Steady running is essential when alternators are to be driven. This has led to better governors, which eliminate as much as possible internal friction.

STARTING ARRANGEMENTS.

These have been greatly improved. On small lighting sets the generator is used as a motor, and the engine is started up as on an automobile. It is unnecessary to start the larger engines by hand. Some are started by a small hand pump attached to the cylinder, which injects a charge of gas or petrol vapour. To the magneto is fitted a special trip which on release causes a spark which fires the first charge. The energy obtained from this is sufficient to carry the engine over the suction stroke, and gas is drawn-in in the normal manner, the engine continuing to run. On twin-cylinder engines or on the larger single-cylinder ones, compressed air is employed for starting purposes. The receivers are charged either from a small compressor or from the main engine cylinder. The latter arrangement is, of course, cheaper, but takes longer. The more usual arrangement is to drive a small compressor by belt from a pulley on the crankshaft of the main engine. The compressor is fitted with fast and loose pulleys, so that it can be stopped when required.

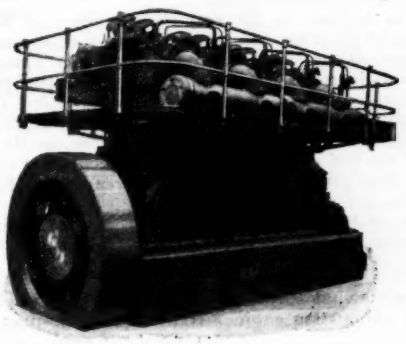
Both these methods, however, have the disadvantage that, should the receivers leak or a pipe burst while the main engine is at a standstill, no pressure is available for starting. Handles are fitted to some of the compressors, but this is a tedious method of refilling the receivers. The better system is to instal a separate small engine to drive the compressor, and so render the starting arrangements independent of the main engine. Some makers supply sets that combine the latter method; the compressor being driven from a crankshaft. This is probably the best solution, as it provides a sure means of starting in the most inexpensive manner. The compressor is fitted with fast and loose pulleys, and is normally driven from the main engine crankshaft. However, a small air-cooled engine is fitted to the same baseplate, and a "V" type motor-cycle belt can be fitted over a groove on the flywheel, and the compressor driven independently of the main engine.

Improvements have been effected in lubrication; and force feed pumps are fitted to all but the smallest engines. On multi-cylinder vertical engines, forced lubrication systems operating at about 15 lbs. per sq. in. are generally fitted.

By far the largest number of vertical town-gas engines are of the single cylinder per crank type. These usually have a higher rotary speed for a given power than the horizontal engine, but the piston speed is approximately the same, as they normally have a short stroke. This fact considerably favours their adoption, since cheaper electrical machinery can be installed. The pistons and liners have a longer life than those of horizontal engines. It is usual to offset the centre line of the cylinders slightly from that of the crankshaft, to reduce side pressure. In the best designs, pressure-fed lubrication systems are fitted.

The ignition is usually duplicated, to prevent unnecessary stops, and consists of a low-tension magneto and coil. An alternative battery ignition is often included for starting or emergency purposes. A change-over switch is fitted, so that either ignition can be used The engines are water cooled, and an open system is used. This enables the attendant to take the outlet temperatures from each cylinder, and so obtain some check that the cylinders are taking equal loads. The governing valves upon each cylinder can be individually adjusted so that each cylinder shall take an equal load. No moving parts are water cooled.

The engines are usually started-up by compressed air, as are the horizontal engines. It is almost universal practice, however, to have a completely independent starting set driven either by an electric motor or by a small engine. A timing valve is fitted which is operated by the camshaft so as to admit compressed air to the cylinder at the proper moment.



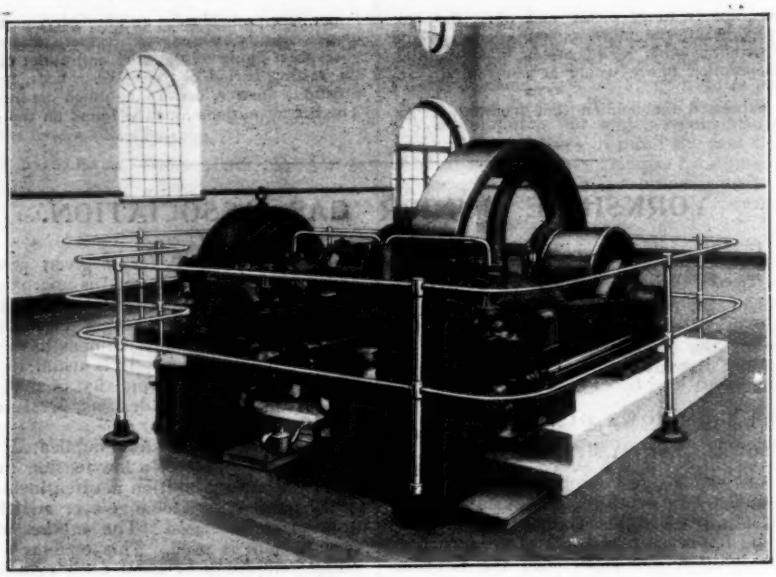
National Vertical Gas-Engine, as supplied to Retford for Generating Electricity from Town Gas.

Another method of starting is by means of a friction starting set. This consists of a small vertical engine operating, by chain drive, a friction pinion which can be brought into contact with the surface of the gas engine flywheel. This causes the latter to revolve slowly, but fast enough for the gas and air mixture to be drawn into the cylinders and fired by the ignition gear. The main engine will then pick up speed, and the friction starting gear can be released. The friction pinion shaft is mounted upon eccentric bushes which can be oscillated by means of a foot lever near the starting position of the main engine. By this oscillation of the bushes the pinion can be brought to bear on the gas engine flywheel or released at will. The starting unit is a two-cylinder vertical engine developing 20 B.H.P. at 750 R.P.M. The reciprocating parts are totally enclosed, and lubrication is effected by a pump supplying oil under pressure to the bearings. The pinion which engages with the smooth surface of the outside diameter of the flywheel is built up of "Ferodo" material, and gives a high coefficient of friction.

THE CRANKLESS ENGINE.

Another development in connection with town gas engines which is being watched with interest is the crankless design. Some of this type have already been constructed in Australia, and are in operation driving gas compressors which are also of the crankless type. In this type of engine the crank is eliminated, and in its place a slant or swashplate is used. The cylinders are horizontally opposed, half at one end of the engine and half at the other.

The slant is placed between them, and power is transmitted from the pistons by means of a Michell special ball and slipper pad bearing or pivoted thrust plate. It is the latter bearing that has made the crankless principle possible, and has enabled large powers to be developed at high speeds.



70-B.H.P. "NATIONAL" TWIN-CYLINDER GAS ENGINE INSTALLED AT THE WORKS OF THE BRITISH GAS LIGHT COMPANY, LTD., HULL.

There are a number of distinct advantages with this type of engine, chief among which are:

The motion of the pistons is purely harmonic—that is, the motion is similar at the end of each stroke. Approximation to this motion has been obtained in the ordinary crank type of gas engine by lengthening the connecting rod; but it is not, as a rule, satisfactory, due to the heavy rod required to prevent whip.

The balance of the crankless engine can be made extremely good by adjusting the mass of the slant to that of the pistons and reciprocating parts. Thus all couples due to inertia or centrifugal forces of the parts can be eliminated. The slant shaft and frame are thus relieved of all stresses due to inertia, whereas in crank type engines these stresses have to be borne by the crankshaft and the bed of the engine. The mechanical efficiency and the heat efficiency should be increased, as higher piston speeds are permissible.

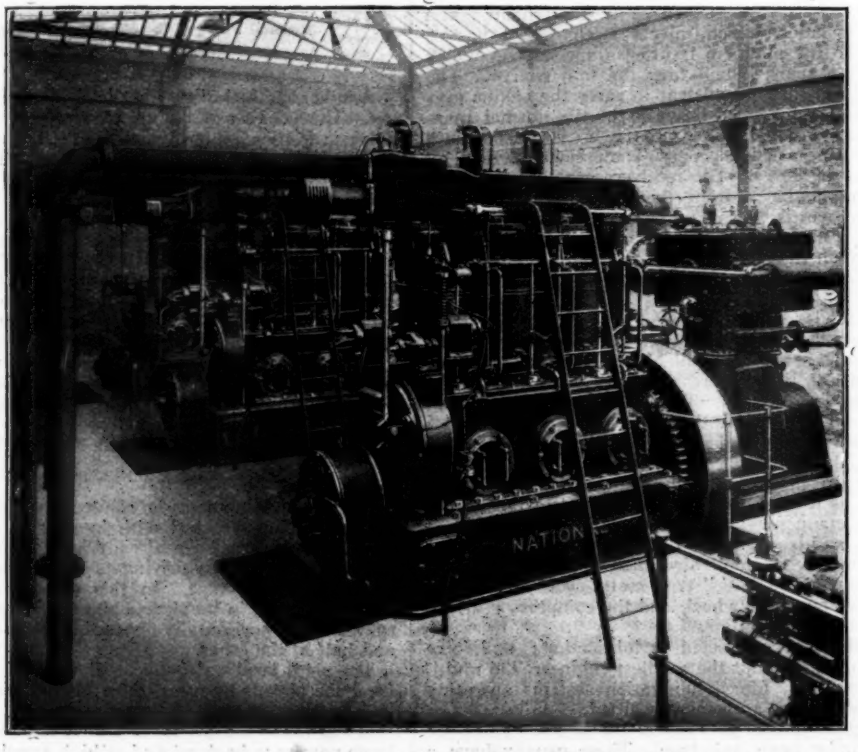
Its ability to be designed as a combined engine and compressor.

Waste Heat.

It is somewhat surprising how seldom the waste heat from internal combustion engines is utilized. Use may be made of the heat lost to the cooling water and that escaping by the exhaust. The hot cooling water can be employed for heating offices or warehouses, or for feed water to steam boilers, &c. The waste heat from the exhaust can be used in drying machines or for generating steam. Wool has been successfully dried by hot air blown by fans over radiators heated by the exhaust gases.

The recovery of waste heat from the exhaust has now been developed to a high degree of success; and special boilers are manufactured for the purpose. Owing to the difficulties that had to be overcome, progress has been somewhat slow. One satisfactory method is to attach to the exhaust of the engine a multitubular boiler, consisting of an outer shell with a chamber at each end interconnected by tubes conveying the hot gases. As is well known, about 30 p.ct. of the heat units of the fuel appear in the exhaust pipe, which means that about 2500 to 3500 B.Th.U. per B.H.P. hour are lost. By means of a boiler, it is usual practice to obtain from this heat about 2 to 2·5 lbs. of steam from and at 212° Fahr. per B.H.P. hour at full load. The outlet temperature of the gases from the boiler has to be kept high at about 350° Fahr., to prevent corrosion. To make up for this loss, cast-iron water heaters or economizers are sometimes fitted in addition to the boiler.

A modern type of boiler has short tubes of moderate diameter,



THREE 150-H.P. VERTICAL ENGINES DRIVING GAS COMPRESSORS AT GLASGOW.

as opposed to many small-diameter tubes. Metallic cores are contained in these tubes, which are easily removable for cleaning purposes. They also determine the outlet temperature of the gases, thus reducing corrosion, especially when the engine is on light load. Steam raising is rapid, due to the design, thus reducing the period of sweating.

Feed water for the boilers can be taken from the water jackets of the engine. The boiler, which takes the place of the exhaust silencer, should be placed as near the engine as possible. If steam or hot water is required only for process work, then it is economical to place a boiler on almost any internal combustion engine; but if the steam is required for power purposes, it is not very economical below 500 B.H.P., since small steam-driven sets are not very efficient.

Costs.

The last part of this paper will be devoted to a comparison of the cost of power derived from three different sources: Town gas, heavy oil, and electricity. In this way we can see how the three compete with one another, and at what price town gas would have to be sold to make its use a commercial proposition when conditions favour the other two. First of all, let us consider the small power user. Small heavy-oil engines are not very satisfactory yet, as they require frequent dismantling and cleaning. The small town gas engine can produce power very cheaply, and upon a competitive basis. Let us consider a 5-B.H.P. gas engine driving a few machines by belt in a small shop. Gas could be purchased at about 6d. a therm in most large towns for power purposes. The cost of such an engine, erected complete, would be about £60. If it works for 50 hours per week at a constant load approaching full load, it would consume approximately 1660 therms per year. The lubricating oil consumption would be about 30 gallons per year. The annual running cost of such an engine would work out as follows:

	£	s.	d.
Cost of town gas, 1660 therms at 6d. per therm	42	0	0
Cost of lubricating oil, 30 galls. at 3s. 6d. per gal.	5	5	0
Interest, maintenance, depreciation, at 12½ p.ct. of capital cost	7	10	0
Total	£54	15	0

The number of B.H.P. hours developed per annum would be 13,000. Thus the cost per B.H.P. hour would be 1·01d.

If we allow 85 p.ct. efficiency for an electric motor, and take into consideration the interest, maintenance, and depreciation on the capital cost of the motor, this price of power is equivalent to obtaining electricity from the mains at 1·25d. per unit. Now it is only in the larger towns that electricity could be obtained at this rate for such small power requirements. Even if electricity could be had at this price, it is probable that the gas company could be induced to provide gas at less than 6d. a therm in order to meet the competition.

No charge for labour is made in the above costs, since the labour required in looking after a modern town gas engine is approximately the same as for the electric motor.

In every town or city of any size, there are a number of shops and warehouses that require electric light for the interior and for display purposes all day long. This provides a good steady load; and it is surprising that more installations of the kind to be referred to have not been put in, as a big economy can be shown. I have in mind (say) a 3-KW. engine and a compound-wound generator suitable for direct lighting, complete with switchboard. Such a set would cost about £120 delivered and fixed complete with all necessary accessories. Suppose the lights are on for 50 hours a week. The fuel and lubricating oil cost will be the same as in the previous example, but the interest, depreciation, and maintenance figure will be increased to £15. Thus the total running cost for the year would be £62 5s. The number of units generated per annum would be 7800. From this the cost per unit would be 1·92d. This is a competitive figure compared with the lighting rates in most of the large towns, even though the client is upon the special system whereby a lump sum is paid per annum, and ½d. per unit used is charged.

As an example of the reliability of these small engines, it may be quoted that the leading railway companies are now using them for driving small pumps for filling their water troughs; the engines having complied with all their exacting conditions as to reliability.

It is when we come to the larger powers, when the cold-starting type of heavy oil engine can be used, that engines running upon town gas become comparatively expensive. But, as mentioned earlier, the larger powers are suitable for generating electricity at the gas-works.

To show the relation between town gas engines, heavy oil engines, and electric power from the mains, four tables have been compiled.

In all these an equivalent price is given for electricity from the mains; and in Tables II. and IV. is given the cost at which town gas must be available to give equally good running costs as heavy oil engines. From Table I. we see that, when running a full week of 50 hours, it would be as cheap to take power from the mains if electricity could be obtained at 1·12d. per unit in the case of the smallest engine, and 0·812d. in the case of the largest. This is considerably more expensive than when power is obtained from heavy oil, figures for which are given in Table II.

TABLE I.—*Town Gas Engines.*

Running Costs at Full Load.

Type.	Horizontal.	Horizontal.	Horizontal.	Vertical.
No. of cylinders	1	1	1	4
Maximum power	22	55	110	440
Full load	20	50	100	400
Capital cost of engine installed	£240 0 0	£430 0 0	£900 0 0	£3700 0 0
Price of gas per therm	0 0 6	0 0 6	0 0 6	0 0 6
Consumption of gas per B.H.P.-hour, therms	0·105	0·098	0·096	0·090
No. of therms per hour	2·1	4·9	9·6	36·0
No. of therms per week of 50 hours	105	245	480	1800
Cost of gas per week	£2 12 6	£6 2 6	£12 0 0	£45 0 0
Cost of lubricating oil per week, and small spares	0 3 0	0 6 6	0 12 6	1 6 0
Cost of labour	0 15 0	0 15 0	1 10 0	1 10 0
Depreciation, maintenance, and repairs at 12½ p.ct. per annum	0 11 6	1 0 9	2 3 5	8 18 0
Total weekly cost	£4 2 0	£8 4 9	£16 5 11	£56 14 0
No. of B.H.P.-hours	1000	2500	5000	20,000
Cost per B.H.P.-hour	0·984d.	0·79d.	0·783d.	0·674d.
Efficiency of motor, p.ct.	85	85	90	90
Equivalent cost of electricity per unit	1·12d.	0·9d.	0·943d.	0·812d.

TABLE II.—*Heavy Oil Engines.*

Running Costs at Full Load.

Type.	Horizontal.	Horizontal.	Horizontal.	Vertical.
No. of cylinders	1	1	1	4
Maximum power	22	55	110	440
Full load	20	50	100	400
Capital cost of engine installed	£300 0 0	£500 0 0	£950 0 0	£4000 0 0
Price of oil per ton	£5 0 0	£5 0 0	£4 17 6	£4 17 6
Consumption of oil per B.H.P.-hour, lbs.	0·48	0·45	0·45	0·45
No. of lbs. per hour	9·6	22·5	45·0	180·0
No. of lbs. per week of 50 hours	480	1125	2250	9000
Cost of oil per week	£1 1 5	£2 10 2	£4 18 0	£18 12 0
Cost of lubricating oil and small spares	0 3 0	0 6 6	0 12 6	1 6 0
Cost of labour	0 15 0	0 15 0	1 10 0	1 10 0
Depreciation, maintenance, and repairs at 12½ p.ct. per annum	0 14 5	1 4 0	2 5 9	9 12 2
Total weekly cost	£2 13 10	£4 15 8	£9 6 3	£31 0 2
No. of B.H.P.-hours per week	1000	2500	5000	20,000
Cost per B.H.P.-hour	0·646d.	0·46d.	0·447d.	0·372d.
Efficiency of motor, p.ct.	85	85	90	90
Equivalent cost of electricity per unit	0·742d.	0·524d.	0·538d.	0·45d.
Equivalent cost of town gas per therm	2·78d.	2·62d.	2·50d.	2·55d.

TABLE III.—*Town Gas Engines.*

Running Costs at ¾-Load.

Type.	Horizontal.	Horizontal.	Horizontal.	Vertical.
No. of cylinders	1	1	1	4
Full load	20	50	100	400
Load	15	37½	75	300
Capital cost of engine installed	£240 0 0	£430 0 0	£900 0 0	£3700 0 0
Price of gas per therm	0 0 6	0 0 6	0 0 6	0 0 6
Consumption of gas per B.H.P.-hour, therms	0·113	0·107	0·102	0·095
No. of therms per hour	1·7	4 1	7·65	28·5
No. of therms per week of 50 hours	85	205	382	1425
Cost of gas per week	£2 2 6	£5 2 6	£9 11 0	£35 12 6
Cost of lubricating oil per week, and small spares	0 3 0	0 6 6	0 12 6	1 6 0
Cost of labour	0 15 0	0 15 0	1 10 0	1 10 0
Depreciation, maintenance, and repairs at 12½ p.ct. per annum	0 11 6	1 0 9	2 3 5	8 18 0
Total weekly cost	£3 12 0	£7 4 9	£13 16 11	£47 6 6
No. of B.H.P.-hours per week	750	1875	3750	15,000
Cost per B.H.P.-hour	1·15d.	0·925d.	0·89d.	0·76d.
Efficiency of motor at ¾-load, p.ct.	80	80	85	85
Equivalent cost of electricity per unit	1·23d.	0·99d.	1·01d.	0·86d.

TABLE IV.—*Heavy Oil Engines*

Running Costs at ¾-Load.

Type.	Horizontal.	Horizontal.	Horizontal.	Vertical.
No. of cylinders	1	1	1	4
Full load	20	50	100	400
¾-load	15	37½	75	300
Capital cost of engine installed	£300 0 0	£500 0 0	£950 0 0	£4000 0 0
Price of oil per ton	5 0 0	5 0 0	4 17 6	4 17 6
Consumption of oil per B.H.P.-hour, lbs.	0·50	0·47	0·47	0·47
No. of lbs. per hour	7·5	17·65	35·3	141
No. of lbs. per week of 50 hours	375	883	1765	7050
Cost of oil per week	£0 15 7	£1 19 5	£3 18 10	£15 15 0
Cost of lubricating oil per week, and small spares	0 3 0	0 6 6	0 12 6	1 6 0
Cost of labour	0 15 0	0 15 0	1 10 0	1 10 0
Depreciation, maintenance, and repairs at 12½ p.ct. per annum	0 14 5	1 4 0	2 5 9	9 12 2
Total weekly cost.	£2 8 0	£4 4 11	£8 7 1	£28 3 2
No. of B.H.P.-hours.	750	1875	3750	15,000
Cost per B.H.P.-hour.	0·767d.	0·542d.	0·535d.	0·45d.
Efficiency of motor, p.ct.	80	80	85	85
Equivalent cost of electricity per unit	0·821d.	0·580d.	0·608d.	0·51d.
Equivalent cost of town gas per therm	2·52d.	2·5d.	2·55d.	2·77d.

It will be seen from these that the price per unit varies from under ¾d. to just under ½d. per unit. These figures, it must be remembered, are not for continuous day and night running, but for a day load lasting ten hours. The last line shows the cost at which gas would have to be obtained to give the same running cost as heavy oil. This varies from just over 2¾d. to just over 2½d. Figures are given for ¾-load, as it is more usual to find engines running at about this load. It will be seen that the increased efficiency of the oil engine considerably affects the price at which gas would have to be supplied. The price of gas has been kept at 6d. a therm for all sizes, but possibly this might be reduced for the larger sizes. There is even a possibility that oil engines might be used at the gas-works if it was decided to supply electricity.

Convertible engines of either the vertical or the horizontal types are made to run on gas or oil. Thus, should the cost of producing town gas be reduced, the engines could then be run on gas. The use of oil engines in gas-works is not such a revolutionary suggestion as it may sound, since many gas undertakings already use fuel from outside in the form of coke-oven gas. However, it is a mistake to think of power production in terms of fuel cost per unit generated only, as indirectly many savings can be effected by using town gas engines. They involve the least capital expenditure. The space taken up is less than that for oil engines, as no fuel has to be stored. The town gas engine shares the advantage of the oil engine over other prime movers in that no stand-by losses occur. It will start up from cold immediately, which is highly important in electricity stations both for use as a main unit and as a stand-by unit. Its fuel is available at all times by merely turning on a gas cock, and no internal combustion engine can run so clean or with such small wear and tear.

At the moment, popular opinion, assisted by the Daily Press, leads one to believe that the secret of cheap power lies in the construction of interconnected giant power stations. The author ventures to disagree with this opinion, and would submit that the better plan would be to utilize existing assets to the fullest extent.

A further point in favour of the gas undertakings laying down their own electricity generating plants is that by so doing the increased use of gas decreases the overhead charges of gas making. The scope for combined gas and electricity undertakings is enormous. The huge electricity schemes before the country may be economical in the densely populated and industrial areas. In the rural districts, where there are few factories, the cost of laying overhead transmission lines is enormous, and it is in these that the combined undertakings could show up to considerable advantage.

It would be interesting to estimate the cost of generating electricity in the gas-works. For this purpose a station having four 400-B.H.P. gas engines installed has been considered, the price of gas being taken at 4d. per therm. A reasonable load factor of 25 p.ct. has been taken; and with this the cost per unit works out at about ¾d.

Little, if any, progress appears to have been made with a high-compression engine having the gas injected at the end of the compression stroke as in the case of the heavy oil engine. It would appear that in this direction, if successful, a most valuable field for the use of town gas for power purposes could be opened up.

ESTIMATE FOR AN ELECTRICITY GENERATING STATION OF 1040 KW. CONSISTING OF FOUR 260 UNITS IN A GAS-WORKS.

It is assumed that the average load will be two engines running at ½-load, and that gas can be obtained at 4d. per therm.

Capital Expenditure.

	£	s.	d.
Four 400-B.H.P. four-cylinder vertical gas engines	14,800	0	0
Four direct-coupled generators and switchboards	4,000	0	0
	£18,800	0	0

Weekly Running Cost

(168 hours per week).

	£	s.	d.
Gas consumption, 3696 therms at 4d. per therm	61	12	0
Lubricating oil and small stores	3	10	0
Labour (2 men—3 shifts)	18	0	0
Depreciation, interest, and repairs, at 15 p.ct. per annum on capital cost	54	4	0
	£137	6	0

No. of units generated per week = 43,630.
Cost per unit generated = 0·75d. approx.

This estimate does not include the cost of buildings, &c., but these would be approximately the same for whatever kind of power was required.

Discussion.

Mr. F. FIRTH (Leeds) asked, regarding the application of town gas to the generation of electricity, if Mr. Browne could give any idea as to cost—especially the difference in costs between units of different size. As to gas-works taking coke oven gas, Mr. Firth contended that, as a definite amount daily was contracted for, it might be reasonable to take a surplus quantity, and generate electricity.

Mr. BROWNE, replying, said that few reliable figures were published of costs of generation of electricity. Regarding the generation of electricity at gas-works, and the subsequent re-sale to power stations, this was already being done in Wales, where power stations were willing to take power from collieries and ironworks. They found they could obtain current cheaper than they could generate it themselves.

Mr. J. W. HOLROYD (Elland) thought that 6d. per therm—the basis taken by Mr. Browne—was a low figure, though they had been told that, unless they could supply at or below this figure, there was no hope of competing with oil engines. One would think that gas engines could be made more efficient; and he was surprised that the vertical engine had not been adapted in smaller units to any great extent. Was there any likelihood of this type of engine being more universally used?

Mr. BROWNE said that small vertical engines were more in demand, though the higher speed might frighten some people. It was true that little improvement in construction and efficiency of the ordinary gas engine had been made in recent years. Experiments with crankless engines were proceeding; and a greater efficiency should be obtained. The larger type of engine was the more efficient. Oil engines were popular to-day. Perhaps the public were led to believe they were more efficient, but it was doubtful whether in the long-run this was correct. There were cases of gas engines running for 25 to 30 years with no complaint and an exceptionally low repair bill. Regarding gas engine possibilities, Mr. Browne thought that the introduction of the Diesel cycle and other improvements could put town gas on an equality with oil. The figure of 6d. per therm he had quoted was simply an easy working basis.

Mr. J. W. WOOD (Leeds) asked whether the makers adopted a standard quality of gas in quoting. Had they found any appreciable alteration to valve settings or pre-ignition when water gas was introduced? During the last ten years or so, had there been a falling-off in power due to a lower calorific value?

Mr. BROWNE replied that, in quoting, they used the net calorific value, and nearly always quoted B.Th.U. per B.H.P.-hour. Regarding the falling-off in power, the chief trouble had been the ignition. In cases where calorific value had dropped, valves were re-set and new cams supplied in some cases.

Mr. C. H. CHESTER (Wakefield) said he did not agree with any idea that finality had been reached in gas engines, though they had not improved much during the past twenty years. On the works with which he was concerned, they had an old-type engine, which thirty years ago had been bought second-hand, fitted with tube ignition. Last year that engine ran daily, 45 to 50 hours per week, without trouble and without repairs. On the other hand, he knew of an engine only two years old which had given considerable trouble. Mr. Chester thought there was not sufficient elasticity in modern engines to meet the varying demands of to-day. He was of opinion that manufacturers were considering oil engines more than gas engines. What type of waste-heat recovery would be suitable for the 34-B.H.P. engine? Regarding Mr. Browne's figures, he thought the lecturer had not debited oil with enough labour cost. Mr. Chester quoted the case of a town where the costs of generating electricity by oil and gas had been equal. Taking everything into consideration, he felt that gas, even at 10d. per therm, beat heavy oil.

Mr. BROWNE said that it was finality of design rather than of efficiency to which he had referred; but the crankless engine would have a large bearing on this subject. Regarding waste heat, practically any size of engine was applicable. From a 12½-H.P. engine, waste heat for office heating, or for heating water for process work, could be obtained. Labour costs in running an oil engine were difficult to apportion; but no more labour was involved with an oil engine than with a gas engine.

Mr. H. V. JESPER (National Gas Engine Company) said the question of waste-heat boilers depended on the load factor of the engine. He instanced a case of a dye-works having a 170-H.P. engine with

a load of 140 to 150 H.P. all the week, and which utilized an old tubular boiler from which an amount of hot water sufficient for the full bore of a 3-in. pipe was obtained for works purposes. Both makers and gas undertakings generally were at a serious disadvantage to-day on account of economic conditions. The high price of gas created difficulties all round. He contended that the installation of country house lighting sets was well worth following up. The makers were certainly doing all they could to push gas engines. The work they did on heavy oil engines was having its effect on the design of gas engines, with the result that gas engine parts were being strengthened, and gas engines themselves to-day were better built, more efficient, and stronger.

Mr. J. W. HORWILL (Bradford) said it would certainly help greatly if prices could be brought down to pre-war rates. It was pleasing to note that in Sheffield the charge for power, as from April 1, would in certain cases be as low as 3·6d. This was a step in the right direction, but unfortunately was not universally possible at present. One place was selling at the rate of 4s., as against 1s. 6d. pre-war. A charge like this was a great obstacle to advancement.

Mr. F. J. JACKSON (Sheffield) asked what was the maximum temperature of the waste gases.

Mr. BROWNE: With a full load, 700° to 800° Fahr.

On the motion of Mr. CHESTER, seconded by Mr. G. C. BRADBURY (Elland), a vote of thanks was awarded to Mr. Browne for his address, and the National Gas Engine Company for their facilities for the paper. Mr. BROWNE responded, and on behalf of his Company acknowledged the vote.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Meeting at the Westminster Technical Institute.

The paper which Mr. Nicol read at this meeting will be of interest throughout the gas industry. His arguments are convincing, and should hearten all those who are tackling the problem of the production, preparation, and disposal of coke, and encourage to similar enterprise those who may be lagging behind in this matter. An unusual feature of the meeting was the display of a kinematograph film by the National Radiator Company.

A Meeting of the Association was held at the Westminster Technical Institute on Friday, Feb. 25—Mr. ARTHUR BROADBENT, of the Gas Light and Coke Company, presiding. Mr. E. W. L. NICOL, Engineer and Fuel Expert to the London Coke Committee, read an excellent paper on the utilization of gas-works coke—a contribution which was followed with great interest and which evoked a particularly good discussion.

The PRESIDENT, introducing the lecturer, said they had with them an expert on the question with which he was going to deal. No one was more capable of discussing the problem of coke than was Mr. Nicol.

THE CASE FOR GAS COKE.

By E. W. L. NICOL, A.M.I.E.E., M.I.Mar.E., Engineer and Fuel Expert to the London Coke Committee.

Perhaps the most urgent phase of the domestic fuel situation at the present time is the provision, in adequate quantities, of a cheap and satisfactory smokeless fuel as an alternative to coal. Our almost complete dependence upon smoke-producing bituminous coal for house heating is probably one of the most unsatisfactory features of our national life, because the present tendency, in spite of the increasing use of gas-consuming appliances, is still an ever-enhanced demand for house coal, which the ordinary citizen must use unless he can be assured of a regular supply of an alternative solid fuel. Domestic coal consumption already approaches 40 million tons a year; and that used in industry, mainly for steam raising, is about 90 million tons, with concomitant atmospheric pollution due to smoke emission, and incidental waste of recoverable bye-products. In Greater London, with whose fuel requirements we are more immediately concerned, the yearly coal consumption for all purposes is of the order of 18 million tons. Taken over the year, the daily average consumption, in round figures, is about 50,000 tons.

In searching for a solution to this unsatisfactory condition, commendable energy and enterprise have been shown by the advocates of the low-temperature process of coal carbonization, which is designed to produce, among other products, a semi-coke or smokeless fuel that will burn satisfactorily in any type of open fire-grate. However true this may be of low-temperature coke, it cannot be claimed for the solid product of the high-temperature process that it will burn satisfactorily in any domestic open grate, however antiquated in pattern; and while all are agreed that in the interests of hygiene and economy some form of smokeless solid fuel should be substituted for coal, the problem appears to be crystallized in the question whether we shall pander to inefficiency and obsolescence by adapting the fuel, by means of radical modification to existing and well-proved processes of carbonization, to suit more or less antiquated and crude forms of heating appliances, or, alternatively, whether we shall improve and adapt fuel-using appliances to use smokeless gas coke in its present form.

Those interested in the exploitation of low-temperature processes, among others, have not hesitated to base their case upon the assumption that coke produced by the high-temperature process as practised at gas-works is wholly unsuitable; and in responding gladly to the invitation of your President to state the case for gas coke, I shall submit that, notwithstanding those strenuous and sustained efforts economically to produce an alternative smokeless fuel, gas coke to-day occupies on its merits, and by favourable contrast, an established position—and one which is daily becoming stronger—in the national life of the people.

Probably the chief obstacle encountered in the London Coke Committee's campaign to popularize gas coke has been a widespread prejudice, often amounting to active antagonism, against this form of smokeless fuel. Coal merchants have described it as "half-burnt coal;" and one firm of furnace coke producers inform the public that their product "has twice the heating value of gas coke," and persist in this ludicrous assertion. The steam user frequently has expressed unqualified the once popular belief that coke would inevitably damage his boilers; the householder has dreaded imaginary "fumes;" and last, but not least, the "smokeless fuel" protagonist has fostered the erroneous assumption that gas coke is useless as a domestic fuel.

Most prejudices are due to lack of information and knowledge, and, with perseverance, are capable of being broken down; others are due to opposing interests. Both can be met and overcome by publicity and a constant reiteration of the facts; and a plain statement giving the facts regarding gas coke is perhaps the best safeguard the public can have against the blandishments of the growing array of coal-selling organizations, anthracite combines, coke-ovens, and low-temperature interests, which now appear to be massing to capture and exploit the domestic fuel market.

There is now no lack of evidence that adverse prejudice of the popular and antiquated kind has largely been broken down; that ignorance is giving way to reason and common sense. Engineers and scientists who a few years ago were frankly sceptical about, and even strongly prejudiced against, coke as a boiler fuel, now openly proclaim its advantages and its superiority, in certain circumstances, to steam coal. For use in electric and other power stations, coke breeze is now so thoroughly appreciated that in several districts there exists a state of constant shortage of supplies; and in the domestic sphere there is a constant and praiseworthy endeavour on the part of inventors to improve domestic heating appliances so that the inherent advantages of gas coke may be more fully realized and enjoyed in the homes of the people.

In the past, coke has also been the subject of much adverse criticism through situations arising from recurring coal strikes; and, not infrequently, through indifferent quenching, grading and screening. Producers of furnace and foundry coke, during trade depressions, have often flooded the market with large, ungraded coke entirely unsuited to any purpose other than that for which it was produced. With a revival of trade in the iron and steel industries, or in the event of a coal strike, the supplies are withdrawn, causing coke consumers further trouble and disappointment. During the 1926 dispute, lasting over six months, supplies of gas coke were maintained, as far as possible, to most regular customers, by carbonizing expensive imported coal; and the prices charged, relative to those of coal, were less than in normal times. However much gas coke may be despised in some quarters, when coal is plentiful and cheap, it is greatly appreciated, and its advantages are often discovered for the first time by domestic and industrial users, when protracted disputes, involving a complete stoppage of supplies, are indulged in by the coal-mining fraternity.

Adverse conditions notwithstanding, it is now claimed that the economic advantages of gas coke as an industrial and domestic fuel are no longer a matter of conjecture. Fuel users of all classes have been educated to its uses. Heating and stoking appliances of various kinds have been adapted to use it to the greatest advantage. The makers of domestic heating apparatus recommend it as an economical substitute for anthracite, and a very large number of steam-users have gauged with extreme nicety the comparative thermal and commercial values of coal and coke, usually demonstrating the economic advantages of the latter. Indeed, comparison has in many cases been of such a hypercritical nature that, had coke been first in the field, the introduction of coal with all its attendant

smoke, dirt, and disadvantages would have been a matter of almost insuperable difficulty.

In so far as it is available, the claim for gas coke produced by the high-temperature gas-works process is briefly that, supplemented by gas, it solves completely the problem of smokeless heating, cooking, and hot water supply. Gas coke can also be used in industry as an economical and smokeless substitute for coal in normally loaded steam boilers of all descriptions; and revenue which accrues from the sale of gas coke enables the gas undertaking to sell its gas at a reduced price. It is therefore in the interest of gas consumers and the community at large that there should be an adequate outlet for the coke produced at gas-works, as it tends materially towards cheaper gas, and facilitates gas-works operations and the recovery of those invaluable bye-products of coal upon which the well-being of a large section of the country's industries depends. No such claim can be made in the interest of any other solid fuel.

In support of these claims it is proposed to adduce independent and disinterested evidence of a nature which may convince the sceptical that, after all, coke has a great deal in it, although, to use a popular but misleading phrase, "so much has been taken out of it."

It is not, however, suggested that gas coke is incapable of improvement. This is fully evidenced, if such evidence were necessary, by the study and research now being concentrated upon it with a view to improve its physical qualities for its various industrial and domestic applications; and, indeed, knowledge already acquired might in many cases be usefully applied in order to maintain quality and accuracy in grading, especially for domestic use. A satisfied coke user, and more especially a coke-boiler user, soon becomes almost hypersensitive to any variation, especially in grading and in moisture content; and if recurring seasonal slumps in the coke trade are to be avoided by enlarging and retaining the domestic boiler market, which is almost non-seasonal in character, it is clearly understood that no effort must be spared to supply regularly an evenly-graded fuel of good and uniform quality.

The Advent of the Coke Boiler.

The convenience and efficiency of gas as a labour-saving agent in domestic life cannot be gainsaid; but with the displacement of the coal-fired kitchen range, with its inefficient, insufficient, and smoke-producing saddle-boiler, the question of continuous and economical hot water supply and refuse destruction becomes acute.

This problem was tackled over thirteen years ago by the London Coke Committee, who then realized the potentialities of the independent coke-fired boiler as an alternative, or an addition, to the gas heated circulator, and as an adjunct to the gas cooker. The Committee have since that time encouraged the development and improvement of the domestic coke boiler in every possible way. They have spent, and continue to spend, considerable sums in bringing it and its advantages to the favourable notice of the public, in testing new boilers, and in advising householders on their selection, installation, and use.

Enterprising boiler-makers have probably done, and are still doing, far more to popularize the coke boiler, also with good effect.

An Ideal Combination.

The kitchen combination of coke boiler and gas cooker is convenient and economical. At a minimum of fuel cost and attention the coke boiler provides a continuous hot water supply, consumes all combustible refuse, and, by means of radiators, maintains in the home an equitable temperature, which, supplemented as and when required by gas fires, tends very materially towards increased comfort and, equally important, towards ameliorating the servant problem by reducing household drudgery, as it entirely eliminates the need for household coal and open fires.

As a labour-saving agent, possessing complete flexibility, this combination of gas and coke consuming apparatus has already become widely recognized, and is now regarded as almost indispensable in modern domestic life, so that the whole aspect of the domestic fuel question is changing, and changing very rapidly, as will be shown later. The potential demand for a free-burning semi-coke fuel for use in open fires is, in fact, diminishing, and at best would be purely seasonal.

Therefore, not soft or semi-coke of high reactivity, but hard high-temperature gas-coke, suitably graded, is for this purpose the ideal fuel; and it has recently been stated by one authority that in residential districts the coke boiler need only be "pushed" far enough in order to absorb the surplus coke output of the gas-works.

Increasing Demand for Graded Coke.

A simple calculation will tend to prove the accuracy of this assertion. The yearly coke consumption of the average domestic boiler is about 5 tons; the present weekly rate of output of one firm of boiler makers (probably the largest) is said to be 1000 domestic boilers sold in the London district alone. While it is maintained, this output necessitates the provision of an additional 100 tons of graded fuel per week, and at least a corresponding decrease in the consumption of house coal. But there are in all some forty firms engaged in producing domestic boilers designed to consume coke; and inquiries tend to show that in this, the domestic boiler department, many at present are fully occupied.

It may in fact be claimed that since gas authorities undertook the supply of accurately graded coke, the manufacture and trade in coke-consuming domestic heating apparatus has received a tremendous impetus. Manufacturers hitherto confining their efforts to the development and sale of closed anthracite stoves have recognized the limitation forced upon their enterprise by the inadequate output and the high prices charged for graded anthracite; and they now recommend the use of coke as a means to increased business.

Modern Domestic Architecture—Influence of Coke.

In the aggregate, the yearly output of coke boilers and other coke-consuming domestic apparatus must therefore mean a considerable annual increment in the demand for graded coke, and a substantial diminution in house coal consumption.

As evidence that the position of coke in the domestic field is now well established, the facts given above are undeniable. If need be, they are further substantiated by the influence of the coke boiler upon the trend of modern domestic architecture, as revealed by the results of the "Daily Mail" Ideal House Competition, recently published. In all classes awarded prizes in this interesting competition, the competing architects include in their designs a coke boiler, a gas cooker, and gas fires; and, in ground-floor plans, space usually allocated to "coal" is now rather significantly designated "fuel."

The Smokeless House.

This interesting development in kitchen planning reveals more than a mere passing interest in the coke boiler. It shows that in the minds of those in authority the dual-purpose kitchen-range has definitely been superseded by two separate smokeless and sootless appliances whose primary functions of cooking, as and when required, and continuous hot water supply, are under complete and independent control, as they should obviously be; and it reveals, let us hope, the true dawn of the era of the smokeless house.

Incidentally, the use of coke boilers, which are also convenient and effective refuse incinerators, must tend materially to reduce the quantity and cost of collecting and disposing of combustible household refuse, as all combustible refuse, including empty tins, can be disposed of in the boiler fire, thus reducing the usual bulky contents of the dust bin to innocuous ash and clinker.

The Open Coke Fire.

During the period of complete transition from coal to gas as domestic fuel, the importance of the open fire must be recognized. The open fire is perhaps the most critical test of any domestic fuel; but in this connection also it can be shown that high-temperature coke has achieved a great measure of success. The defects of many of the older types of firegrates are now generally recognized and understood; and it is probably only the cost of replacement that prevents their removal. Their limitations to coal of the expensive free-burning variety has led many scientists to devise processes for producing partially carbonized coke possessing this coal characteristic; while others, equally progressive, and perhaps more enlightened, have devised improved firegrates which consume, satisfactorily, coke of the ordinary gas-works description.

Public Demonstrations.

At the 1925 British Empire Exhibition the kindling and operation of modern firegrates of this description with ordinary gas coke exclusively was demonstrated daily to a very large number of visitors by the Gas Light and Coke Company. These brilliant coke fires were the envy of all, and in cold weather the Mecca of many visitors and exhibitors.

Further and independent evidence as to the utility and economy of high-temperature gas coke as fuel for open fires, and its radiant and commercial value as compared with house coal, is contained in the report on a series of tests made by Dr. H. Osborne, Medical Officer of Health, Salford, which was published recently in the "Manchester Guardian."

Independent Tests.

The tests were made in two similar rooms, using the modern all-firebrick well-type grate. For one week coal was burned in one room and coke in the other. The following week this arrangement was reversed. The comparative observations of this series of tests—thirty in all—were made between 7 a.m. and 5 p.m. on five days per week.

The results of these experiments showed that the average temperature maintained in the room in which coke was used as fuel was slightly in excess of that maintained with coal; the figures being 58·5° and 58·2° Fahr. respectively. The average daily coke consumption was 15¼ lbs; while the average daily consumption of coal was 22¼ lbs. Dr. Osborne, according to the "Manchester Guardian," further states that "the coke gave a beautiful radiant fire and no smoke whatever; nor was there at any time any evidence of sulphur fumes in the room in which this fuel was being used."

A popular fallacy is that an open coke fire requires a strong draught. Obviously the chimney draught can have very little influence upon the combustion of coke or any other fuel in a

modern firegrate; and in his pamphlet on this subject, Prof. Boys has shown that the chimney draught can with advantage be diminished to the minimum necessary to carry off the combustion products, and the bottom grating dispensed with altogether, with further advantage. In order to prove the efficacy of this latter feature, one of the coke fires maintained by the Gas Light and Coke Company throughout the last Wembley Exhibition was constructed in accordance with Prof. Boys' design.

The only criticism of this and the other coke fires shown was that the radiation was sometimes perhaps more than appeared to be necessary; but Prof. Boys claims that the rate of combustion can be controlled within wide limits by varying the method of stoking, as will readily be understood.

The results of these tests and demonstrations tend to prove the fallacy of assuming that coke for domestic use must contain more than the ordinary proportion of volatile matter, or that any change in the mode of carbonization is really necessary for the production of a suitable solid smokeless fuel for domestic use.

Precise requirements vary in different districts; but the ever-growing diversity in demand and the increasing use of gas coke for fuel purposes is perhaps the best possible evidence that in its two distinctive forms, "vertical" and "horizontal," it satisfies both the domestic and the industrial needs of the public.

GAS COKE IN THE INDUSTRIAL FIELD.

In the industrial field, and apart from central heating, the greatest demand for coke is now probably as a smokeless substitute for the higher grades of steam coal commonly used for power purposes and institutional work; and in view of possible competition with State-aided electricity, this outlet for coke, which tends usefully to diversify the demand, might be regarded as a diminishing one.

There is, however, a large and influential consensus of opinion that in this country the small, or comparatively small, steam power plant will continue to justify its independent existence. The factors which govern power and steam production costs are now more thoroughly appreciated; and where pass-out steam or exhaust steam is required for heating or process work, as it is required in most institutions and many industries, the independent steam plant has fully met the competition of the public electricity supply, even from modern super stations, as in these circumstances power and lighting can often be obtained almost as a bye-product.

CENTRAL HEATING.

For use in low-pressure central heating boilers, gas coke is now regarded as almost indispensable. The conditions of service are exacting, and almost identical with those of the domestic hot water boiler. Complete flexibility of control is imperative, if convenience of operation and economy in fuel consumption are to be maintained. These conditions necessitate fairly even grading, to facilitate banking over long periods—frequently from Saturday to Monday—and a low volatile content, together with a satisfactory reactivity to ensure complete control and to prevent fouling of the heating surfaces. It is claimed that gas coke is the only fuel generally available possessing these desirable characteristics. Other solid fuels are available and are used for central heating; but the fact that gas coke finds in central and glasshouse heating one of its most important outlets is perhaps the best evidence that it is preferred, on its merits, as the most economical and convenient fuel for this purpose.

In certain isolated cases, oil fuel has displaced coke in central heating boilers; but only where conditions of use preclude the handling of solid fuel, or where the cost of operation is a secondary consideration.

COKE TESTED AT THE COUNTY HALL, LONDON.

In other cases, especially where the boilers are operated at, or occasionally over, their full normal capacity, expensive Welsh coal of the highest calorific power has been considered necessary in order to maintain the required output. One such case was the new County Hall, London, where coal of this description was in use; and the following details of official trials with Welsh coal and coke—the latter carried out by the Council's Engineers and representatives of the South Metropolitan Gas Company—may afford convincing evidence of the comparative thermal and commercial efficiencies of ordinary gas coke and coal of the highest quality.

Owing to restricted space, it was not possible to include economizers in the heating-plant at the County Hall, so that in using Welsh coal it was found, during periods of heavy load on the boilers, that the temperature of the waste flue gases was as high as 950° Fahr. These hot gases leaving the chimney often caused trouble, and the question of lengthening the chimney shaft was considered; but one result of introducing coke at this juncture was a reduction of the temperature of the waste combustion products to the neighbourhood of 500° Fahr. at full load, so that the necessity for raising the chimney shaft was entirely obviated.

FINANCIAL SAVING EFFECTED.

This result was in itself of considerable moment; but the saving in fuel costs effected by substituting gas coke for coal was of far greater importance. According to figures published in "The Fuel Economist" for December, 1926 (Table I.), an actual monetary saving (based on prices ruling at the date of the tests) of £20 per week has been effected. Table I. shows also that the prevailing atmospheric temperature was much lower during the coke test, which would account for the increase in tonnage fired.

Tabulated detail figures of the tests are also given in Table II. These figures afford an interesting study.

TABLE I.—*Comparative Economic Efficiency of Welsh Steam Coal and Gas Coke at the County Hall, London, S.E.*

Welsh Coal.				Gas Coke.			
Date, 1925.	Tonnage, 24 Hours.	Lowest Atmos. Temp.	Fuel Cost.	Date, 1925.	Tonnage, 24 Hours.	Lowest Atmos. Temp.	Fuel Cost.
	T. Cwt.	° Fahr.	£ s. d.		T. Cwt.	° Fahr.	£ s. d.
Feb. 21 .	10 4	36	23 9 2	Mar. 10 .	13 5	30	22 12 8
,, 22 .	10 4	38	23 9 2	,, 11 .	12 11	32	21 8 9
,, 23 .	11 2	36	25 10 7	,, 12 .	14 10	28	23 18 4
,, 24 .	11 5	37	25 17 6	,, 13 .	13 16	34	23 11 6
,, 25 .	11 5	42	25 17 6	,, 14 .	13 17	35	23 13 2
,, 26 .	10 6	42	23 13 9	,, 15 .	13 2	42	22 7 7
,, 27 .	10 15	42	24 14 6	,, 16 .	11 19	39	20 8 4
,, 28 .	10 10	40	24 3 0	,, 17 .	11 9	43	19 11 3
Mar. 1 .	10 8	40	23 16 1	,, 18 .	11 13	32	19 18 0
,, 2 .	10 12	38	24 7 7	,, 19 .	12 0	36	20 10 0
,, 3 .	10 10	38	24 3 0	,, 20 .	11 3	46	19 0 11
,, 4 .	10 14	38	24 12 3	,, 21 .	11 19	34	20 8 4
,, 5 .	10 10	42	24 3 0	,, 22 .	11 14	32	19 19 8
,, 6 .	10 1	42	23 2 3	,, 23 .	11 15	32	20 1 4
Total .	148 6	39·3 Aver.	340 19 4	Total .	174 16	35·3 Aver.	297 9 10

Av. lbs. water circulated per 24 hours:		Av. temp. rise:	
Coal	14,906,600	Coal .	15·61° Fahr.
Coke	15,300,000	Coke .	17·15° Fahr.
		£	s. d.
Welsh steam coal cost (14 days) . .		340	0 0
Gas coke cost (14 days)		297	0 0
		£43	0 0
Gross saving per week . . .		£21	10 0
Allow for extra ash removal. .		1	10 0
Net saving per week		£20	0 0

TABLE II.—*Details of Welsh Coal and Gas Coke Test Results—County Hall, S.E.*

—	Duration of Test.	Av. CO_2.	Av. Flue Temp.	Av. Thermal Efficiency.
		P.Ct.	° Fahr.	P.Ct.
Gas coke .	72 hours, 3 boilers	14·5	464	82 0
,, ,, .	8·5 ,, 2 ,,	17·8	516	86·0
Welsh coal .	72 ,, 2 ,,	15·6	531 to 950	82·5

Average thermal efficiency over continuous test period of 80·5 hours with coke as fuel	84·0 p.ct.
Average CO_2 do. do.	16·15 ,,
Average flue temp. do. do.	490° Fahr.

RADIANT VALUE OF GAS COKE.

The remarkable drop in the outlet or final temperature of the flue gases, amounting to over 400° Fahr., when gas coke was substituted for Welsh coal, calls for special comment, as it proves coke's relatively high radiant efficiency. Had the competing fuel been ordinary bituminous coal or "smokeless fuel" containing a higher percentage of hydrogen and hydrocarbons, and less fixed carbon, the difference would undoubtedly have been greater, under similar load conditions. As it is, a net gain in efficiency of 1·5 p.ct. was recorded, over a continuous test period of 80·5 hours, in favour of gas coke as compared with what is generally regarded as the most efficient coal produced in this or any other country; and this result was obtained under natural draught conditions, similar but more strenuous conditions of load, and without alteration to the boiler furnaces.

Bearing upon this question of fuel efficiency and the value of direct radiation in steam-boiler practice, there are two recent and authoritative pronouncements which cannot too often be repeated. The Fuel Research Board say: "Coke gives more radiant heat than coal of higher calorific value;" and, according to an eminent Professor, "Radiation is by far the most potent form of heat transfer—direct and instantaneous; carbonic oxide flame radiates 2·5 times as much as hydrogen flame." The chief characteristics of gas coke in process of active combustion are, as everybody knows, intense radiation and carbonic oxide flame; and in the possession of these characteristics, and in its freedom from hydrogen, gas coke is unexcelled by any other fuel. Gas coke of average quality contains 85 to 90 p.ct. of fixed carbon—the most important of all fuel constituents—and by far the greatest portion of the heat developed by the combustion of coke is radiated.

This precisely is the lesson that the London Coke Committee have patiently been urging upon steam users, with good effect, for the past thirteen years. That it is now beginning to find

spontaneous expression and confirmation in authoritative quarters is proof that the claims made for gas coke have not been exaggerated.

Minimum Excess of Air—High CO_2.

Another interesting feature of the L.C.C. tests is the high proportion of CO_2 maintained continuously, night and day, in the boiler flue gases—proving that coke can be consumed efficiently, at an economic rate, under natural draught conditions, and in its natural and untreated state, with a minimum excess of air (probably less than that required, under similar conditions, by any other solid fuel). The resulting high temperature head developed in the boiler furnaces enabled coke to maintain the full normal and overload output of the boilers—*i.e.*, 5 million and 7 million B.Th.U. per hour per boiler.

With a total heating surface of only 869 sq.ft. per boiler, the result is equivalent to a maximum heat transfer of over 8000 B.Th.U. per sq.ft. of heating surface per hour—a figure rarely exceeded in hand-fired steam boiler practice; while at the same time an average efficiency of 86 p.ct. was recorded over a test period of 8·5 hours.

The following are details of analyses and calorific values of the Welsh coal and gas coke used.

—	Welsh Coal.	Coke.		
		Sample No. 1.	Sample No. 2.	Sample No. 3.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Moisture	1·6	8·72	8·75	1·75
Volatile	10·82	1·75	2·09	1·18
Fixed carbon	79·47	80·48	80·13	88·09
Ash	8·1	9·05	9·03	8·98
Gross calorific value:	14,070 B.Th.U.		12,130 B.Th.U. av.	
Sulphur content:	0·7 p.ct.		0·9 p.ct.	

Although not uncommon, the high efficiencies obtained with both Welsh coal and coke on these tests are not only a measure of the relative commercial values of these two fuels, which often meet in competition, but show that by reasonable care and supervision the efficiency of the comparatively small hand-fired boiler plant can be made to approach that of the largest power stations fired by mechanical stokers or pulverized fuel.

Coke for Steam Raising.

The use of coke as fuel for small, or relatively small, steam boilers of the Cochran vertical type, commonly found in small factories and steam laundries, is now so general as to call for no further proof of its suitability and economy. The case of one laundry, situated near Camberwell Green, S.E., may, however, be mentioned as indicating and confirming again the comparative values of Welsh coal and gas coke. At this laundry, Welsh coal had been used in a large Cochran boiler because it was believed that no other fuel would maintain the head of steam required. The weekly coal consumption had averaged, over a long period, 7 tons. The laundry manager was induced to try coke, which, fired on correct lines under expert supervision, fully maintained the output of steam required. The average coke consumption, over a period of many months, has been 6 tons per week—a clear saving of over 50 tons a year, in addition to the difference in price per ton, which was considerable.

This result, as in the case of the County Hall quoted above, tends also to prove that the actual composition of a fuel, as distinct from its calorific value, has an important bearing upon its suitability for a given type of boiler. In both cases the boilers were of the popular internally-fired type.

In both cases, the results obtained with coke compare very favourably with those obtained with coal of a much higher calorific value, and show that calorific value is no complete criterion in comparing the intrinsic value of fuels. Viewed from another standpoint, the results obtained may be taken as a measure of the efficiency not only of the boilers, but of the fuel as used in that particular kind of plant.

Coke for Lancashire Boilers.

As fuel for the Lancashire boiler, which is by far the most commonly used in this country, coke is frequently forced into competition with bituminous coal; and as evidence of its superiority the case of Tooting Bec Hospital may be cited, as figures relating to the efficiency of the boiler plant at this important institution have also recently been published by an independent authority.

In 1916, a test was carried out at this hospital with a view to introducing gas coke as a substitute for the hard steam coal then in use, which gave an evaporation of 8 to 9 lbs. per lb. of coal, from and at 212° Fahr. The yearly coal consumption was then about 3000 tons.

The average evaporation obtained during the trial with coke exclusively as fuel was 10·7 lbs. Coke has since been in almost constant use; and according to figures published in "The Fuel Economist" for June, 1926, the evaporation obtained throughout 1925 (24 hours per day) averaged well over 10 lbs. per 1 lb. of coke, showing that the results obtained on the original day-load test have been fully maintained.

Describing the boiler plant, "The Fuel Economist" says: "The coke employed is supplied by the South Metropolitan Gas Company, and is remarkably free from moisture; this being in the region of 3 p.ct. The proportion of ash is about 13 p.ct.; 5000 lbs. evaporation per boiler per hour can be attained; the depth of fuel in the furnaces is from 8 to 9 in., which has been found to be the depth giving the most economical results in firing coke. This fuel, while giving a high radiant heat, has not the disadvantage of coal, in that no soot is deposited on the boiler tubes and plates, and the necessity for frequent cleaning is eliminated.

Draught Required for Gas Coke.

"A point which will be of interest to coke users is that of the draught used at the hospital. It is found that the best results are obtained by having the damper only one-quarter open. This provides sufficient draught to secure the necessary combustion of the coke, with natural draught, in spite of the low temperature at the base of the stack, which averages only 240° Fahr. The temperature of the feed water is increased 70° Fahr. in the economizers by a drop in flue gas temperature of 160° Fahr.

"In a plant of this type (4 30-ft. by 8-ft. Lancashire boilers) where a fairly regular load is carried, coke of a satisfactory character shows to a greater advantage, both in regard to evaporative efficiency and also from a financial point of view, than coal of high grade."

This plant, though used in a hospital, is typical of a very large number of industrial steam plants. That it can be operated economically, without the emission of smoke, is proved by the figures which have been published, showing evaporation obtained per boiler, and per lb. of coke. The boilers are fitted with steam-jet forced draught furnaces, but are usually operated under natural draught.

Mechanical Stoking: The "Sandwich" System.

The natural-draught chain-grate mechanical stoker is, perhaps, the type of stoker most commonly used in electric and other power stations in this country. Essentially a coal-burning stoker, it is in ordinary circumstances unsuitable for use with coke; but the discovery of a method which is now known as the "Sandwich" system, which has been patented and introduced into many power stations, including several of the most important electric power stations in this country, facilitates the use of a large percentage of coke or coke breeze "sandwiched" between the grate and an upper layer of small coal.

Since its introduction, the "Sandwich" system has been the means of absorbing great quantities of coke breeze; and it not only utilizes coke breeze of the finest description (100 p.ct. through ⅜ in. mesh) but—and herein is the secret of its success—it also facilitates the use of very inferior coal slack on chain grates, without previous treatment of any description (such as drying and pulverizing), that is, really low-grade coal of a kind which, however cheap or plentiful it may be, cannot economically be used alone on natural-draught chain-grate stokers. There are other types of mechanical stoker, usually fitted with forced draught, which burn coke breeze alone; but it is rather significant that even these are now adapted to operate on the "Sandwich" system in some of the largest power stations.

Utilizing Low-Grade Coal.

In this connection it may be of interest to digress for a moment to consider the potentialities of the "Sandwich" system and its possible bearing upon the larger question of coal conservation by facilitating the utilization of low-grade qualities of coal, which are now left unworked in the pits in great quantities (several million tons a year) because they contain an ash content only slightly above that of the marketable qualities. The problem of utilizing this class of coal is at the present time the subject of research in most important countries of the world. Popular ideas contemplate the cleaning of all such high-ash coals by a more or less costly process of water washing, which inevitably results in the loss of much of the smaller coal in the form of useless "slurry" or slime, while leaving a considerable amount of moisture in the washed coal.

It has been claimed that such high-ash coal can be pulverized and used in that form for steam-raising; but to dry and pulverize coal containing 25 to 30 p.ct. of inert mineral matter does not appear to offer any economic advantage, if it can be used efficiently untreated. Experience tends to prove that high-temperature coke breeze cannot be pulverized economically.

That such coal is now used at important power stations in conjunction with coke breeze, economically and in its natural state, by means of the "Sandwich" system, does not appear to be sufficiently well known; and the high efficiencies realized by its use on this system should tend materially towards overcoming the objection to the conveyance of high-ash coal over long distances, as the pit-head price of such coal is always relatively low compared with its calorific value.

Coke-Fired Power Stations: London.

One or two instances may be cited indicating the sound basis upon which the "Sandwich" system of burning coke and coke breeze has been instituted in this country, notwithstanding the practical advantages which are justly claimed for the pulverized coal system.

Equipped with the "Sandwich" system as an emergency

measure towards the end of the war, one power station in London has consumed, at the time of writing, over 300,000 tons of coke breeze at the rate of about 40,000 tons a year, a quantity equal to about half its total fuel consumption; and upon the strength of this experience a new boiler house at this station has been fully equipped with divided overhead coal and coke bunkers and "Sandwich" system chain-grate stokers. Its adoption in this case has been stated to be influenced by the fact that only by means of this system can the very friable small coal from the recently developed Kent coalfield be used efficiently on chain-grate stokers. This coalfield is the nearest to London, which needs, as already stated, 50,000 tons of coal a day; so that to utilize the smalls unavoidably produced at the pits is obviously a matter of great economic importance.

In the same district, at the London County Council Tramway power station, which consumes over 3000 tons of fuel per week, the "Sandwich" system was installed in 1918. Yearly contracts for coke and coke breeze have amounted to 45,000 tons.

Provincial Power Stations.

Another case indicating the economic efficiency of the "Sandwich" system may be cited—namely, that of the new super power station at Barton, Manchester. In this instance, the boilers, each of 100,000 lbs. per hour capacity, give their full normal output with 50 p.ct. of coke breeze. The over-all efficiency is 84 p.ct., which is equal to that obtained with coal alone, but of a slightly higher calorific value, according to comparative test figures which have been published in "Engineering" in January last year.

In this case, too, the "Sandwich" system has been incorporated in the design of the station, and mechanical stokers upon the strength of previous experience. According to the Report of the Electricity Commissioners, the Barton power station is the most efficient of all the electric power stations in this country. It is not, of course, claimed that this achievement is due to the use of coke breeze; but it is claimed that the results compare favourably with those obtained or guaranteed so far with pulverized coal in this country.

Further instances could be given—including that of Darlington, which station has claimed the lowest recorded fuel cost per unit generated—where this simple adaptation of the chain-grate stoker to use coke breeze and coal slack has successfully been adopted at power stations and at factories, collieries, &c. However, it is hoped sufficient has been said to indicate that by means of the "Sandwich" system an actual and potential demand for coke breeze has been created which tends to prove that the intrinsic value of this fuel is now thoroughly appreciated.

In conclusion, the important position of the gas industry in the service of the Metropolitan community is shown by the following figures: At gas-works in the Greater London area, in a normal year, about 5 million tons of coal are carbonized, producing over 63,000 million c.ft. of coal gas, and, in addition to other valuable bye-products, 2,500,000 tons of coke for sale, of which about 400,000 tons are exported. That the remaining 2,100,000 tons of gas coke are consumed annually in and around London, mainly for the purposes which I have indicated, is in my submission irrefutable evidence that among smokeless fuels gas coke holds, on its merits, and in spite of its detractors, a very strong position in the favour of the London public.

Discussion.

The PRESIDENT said that they took heart at the conclusive evidence which had been put before them of coke's potentiality and growing field. The paper was full of data; and Mr. Nicol had made out an excellent case for coke. He had drawn attention to the fact that those interested in other forms of this fuel were not keeping to the facts regarding their product. He had mentioned that coal merchants had described coke as "half-burnt coal," and that a firm of furnace coke producers had told the public that their product had twice the heating value of gas coke. This sort of thing, remarked Mr. Broadbent, was certainly bad salesmanship.

Coal, Coke, and Gas Fires.

Mr. F. S. LARKIN (Gas Light and Coke Company) observed that Mr. Nicol's paper was a good résumé of the position of coke. The lecturer had put forward the view that the kitchen combination of coke boiler and gas cooker could be regarded as ideal. This combination was, of course, an excellent proposition; but, asked Mr. Larkin, was it eminently successful for ordinary domestic use? They all knew that heat without ventilation was bad; and he thought that, where the heating was by hot water radiators, there was a tendency, in order to obtain the full effect of the heating, to have the rooms, &c., inadequately ventilated. In consequence of this, needless to say, there was a stuffy atmosphere which was not conducive to health. If they were going to do away with the coal fire, the best policy to pursue was to go direct to the gas fire. He was speaking, of course, of domestic premises. In large buildings heating by hot water was good. Mr. Larkin asked the lecturer whether he considered the open coke fire a really practical proposition from the domestic viewpoint. If they intended to eliminate the smoke and dirt of the coal fire, was it not preferable to adopt the gas fire as a first and final step, rather than employ coke as a sort of intermediary stage? During the recent coal strike many people had used coke in the open grate; and though it had to be borne in mind that in this period the coal carbonized was far from ideal, there was no getting away from the fact that a coke fire created dust. Personally he was inclined to think that a coke fire created more dust than the coal fire. The former required more attention, and, if it became too low, it took a long time to regain its bright incandescent state. At one part of his career he had charge of the boilers at a certain station. There were 120 boilers in all, including Lancashire, Cornish, and Babcock types. They used coke, and found that it occasioned no erosion troubles. They found that an 8 in. to 9 in. fire depth gave the most satisfactory results. But, observed Mr. Larkin, he queried whether coke was as elastic as coal for steam raising. If the steam pressure for some reason fell considerably, it was difficult to raise this pressure quickly when coke was being used. Moreover, with coke the work of ensuring a clear fuel bed was not an easy process. Doubtless, however, the "Sandwich" system of boiler firing had greatly improved the efficiency of coke for this purpose, and had done away with many difficulties. He hoped that a domestic coke grate would be evolved by which coke could be burnt satisfactorily without needing attention and without creating dust.

Three Phases of the Coke Problem.

Mr. W. T. KENSHOLE (Lea Bridge) remarked that during the last ten years probably as much attention had been given to the subject of coke as this fuel had received since it was first known. This fact was all the more surprising when they remembered that the coke produced on the average gas-works amounted to about 70 p.ct. by weight of the coal carbonized. This, coupled with the fact that sales of coke by the London Companies accounted for approximately 20 p.ct. of the total revenue, made them realize how important it was that the gas engineer should have a regular market for his coke, because of its important bearing on the price of gas. The problem of coke could be divided broadly under three headings: Production, preparation, and disposal. With regard to production, they were, of course, limited by the class of coal they carbonized, and by the fact that different coals varied widely in ash content. It was on this account that he had been so pleased to read the remarks made by Dr. Rudolph Lessing in a recent lecture before the Royal Society of Arts. In this lecture Dr. Lessing had shown what savings could be effected in transport charges by the supply of clean coal; and the ash in the coal naturally determined the ash in the coke produced. Mr. Kenshole said he had been interested in a table which had been published recently giving the ash content in coke after steaming in vertical retorts. One would naturally suppose that the percentage of ash in the coke would be increased as a result of steaming; but this had not been proved by the figures in the table to which he referred. These figures indicated that as the percentage steaming increased, the ash content of the large coke decreased, while that of the breeze increased. He looked forward to further work on this subject. The question of preparing coke for the market was being tackled by most gas companies, though it had yet to be proved whether they had the most efficient screening and grading plant. The problem of screening and grading was bound up in that of quenching; and in this regard he thought that those having vertical plant had an advantage over those possessing horizontals, for the former could without difficulty keep down the moisture content of the coke to a minimum. The third phase of the coke problem was that of disposal. His Company did not secure a great sale of their coke until they commenced grading and screening; but now the average domestic sales were between 25 and 30 p.ct. of the total coke output. Mr. Kenshole said he could not agree with Mr. Larkin that the open coke fire required a great deal of attention. With a suitably designed grate, not only was a coke fire better than a coal fire, but it needed no more attention. He did agree, however, that the ash difficulty was one hard to overcome. The ash from coke appeared to be of a lighter nature than that from coal, and it was more apt to fly about. But there was no question that a coke fire was thermally more efficient than a coal fire. In a suitably designed grate, coke gave an efficiency of 24 p.ct. For coal burned under equally suitable conditions, the equivalent figure was only 21 p.ct. The preparation of coke influenced largely this efficiency figure of 24 p.ct.; for the thermal efficiency of the fire was reduced considerably as the moisture content of the coke increased. He would ask Mr. Nicol whether, in the case of the "Sandwich" system, there was any difficulty in obtaining adequate and constant supplies of coke breeze, now that gas undertakings were taking precautions to reduce the quantity made.

Mr. E. E. CALVERT (Gas Light and Coke Company) asked Mr. Nicol whether he objected to the washing of coke on the ground that it increased its moisture content. Did this in any way detract from its good-burning qualities in the open grate. Also, was vertical coke more suitable than horizontal coke in the open firegrate.

Steam Raising by Coal and Coke.

Mr. W. NEWTON BOOTH (Woolwich Arsenal) said he would like to add his quota of praise to Mr. Nicol for his very able paper. The lecturer had given a figure of 5 tons per annum as representing the average consumption of the domestic coke boiler. This implied that 8 tons of coal would have to be carbonized in the gas-works to produce this amount of coke; and the gas produced, at a conservative estimate would be 100,000 c.ft. Consequently a consumer who had a coke boiler and who also took 100,000 c.ft. of gas yearly was very valuable to a gas undertaking. Regarding the "Sandwich" system, continued Mr. Booth, when he had investigated this in connection with the firing of Babcock boilers, the difficulty of getting an adequate and continuous supply of coke breeze had arisen; and he had not found a gas company who would guarantee a supply. This guarantee was, of course, essential. However, the tendency of raising steam on gas-works by waste heat was increasing the amount of coke breeze available for sale; and this should assist in the development of the "Sandwich" system. Mr. Nicol had spoken of the use of gas-works coke in Lancashire boilers. He (the speaker) had seen the installation at the Tooting Bec Hospital, referred to in the paper; and it was certainly working efficiently. Everyone, however, was not in the same position as was the case at Tooting Bec, where only 5000 lbs. of steam per hour was the evaporation required from an 8 ft. Lancashire boiler. He had four 8 ft. by 30 ft. Lancashire boilers, and had to get from these an evaporation of

50,000 lbs. of steam an hour. It was impossible to obtain an evaporation exceeding 6000 lbs. an hour using gas-works coke, unless alterations were effected in the firing arrangements. It was interesting, too, to regard the position of coal supplies in London. He did not think that gas companies supplying coke could compete with water-borne coal. Steam coal of a guaranteed calorific value of over 13,000 B.Th.U. per lb. could be delivered alongside the works at 17s. a ton. The position was, of course, different in scattered districts.

Mr. F. H. Holland (North Middlesex) asked Mr. Nicol whether he could give them an idea of what sizes of fuel were most suitable for coke boilers, open fires, and anthracite stoves.

Mr. G. Percival (Fuel Research Station), speaking of the tests carried out at the London County Hall, and referred to in the paper, suggested that it was hardly fair to compare the temperatures of the flue gases when using coal and coke respectively. It appeared to him that the coal was being burned with insufficient air supply.

Dr. Owens' Stove.

Mr. F. G. Palmer (Messrs. Bruster & Richardson) said he had been interested in the remarks concerning the open coke fire. Great difficulty had been experienced in evolving a stove which would burn coke satisfactorily; and many designs had proved failures. The difficulties, however, had now been overcome in a new stove which was now actually in existence. This was the invention of Dr. J. S. Owens; and though he (the speaker) was not in a position to give them any reliable figures, he could say with every confidence that the new stove would revolutionize the use of coke in the open grate. The firm with which he was associated were at present testing the stove with small coke and nuts. Small coke gave a fiercer fire, but the walnut size gave a good enough fire, and was more economical. The ordinary coal fire burned from the bottom upwards. Dr. Owens' coke fire, however, burned from front to back; and by adjusting a damper in the ashpan the fire could be controlled. Another important feature of the new stove was that the fire could be kept alight for any length of time, and quickly arrived at a state of incandescence. It would doubtless constitute an excellent medium for the disposal of gas-works coke. He would like to ask the lecturer whether coke was more economical, more efficient, and more easily managed than anthracite in domestic hot water boilers.

The Author's Reply.

Mr. Nicol said that the President had referred to what might be termed the ethics of salesmanship. Perfect truth and perfect salesmanship were, perhaps, incompatible; but the furnace coke producers had gone beyond what was necessary in their observations on the calorific value of their product. If the latter had double the calorific value of gas coke, it must contain 24,000 B.Th.U. per lb., which was manifestly absurd. He only hoped its reactivity was not above the normal. [Laughter.] Mr. Larkin had raised some interesting points. For one thing he had mentioned the use of hot water radiators. For small houses the method was, perhaps, out of the question; but a radiator supplemented by the gas fire made an ideal house-heating arrangement. As for the dust when employing coke in the open fire-grate, a certain amount was unavoidable. Gas fires were, of course, to be preferred, but the question of cost had to be considered, and for continuous use solid fuel was undoubtedly cheaper than gas at present. The question of the flexibility of coke for steam raising had been asked. He thought that, with modern forced draught furnaces and sloping bridges, coke fires could be cleaned without loss of pressure head. It had been urged that, when the steam pressure fell to a low figure, there was a difficulty in raising it quickly by coke. Coke, however, had a lower specific heat than coal; and consequently, when fresh coke was added to the firebed, it had not the same damping effect as had coal. Mr. Kenshole had spoken of the influence of the revenue from coke on the price at which gas could be sold. At present the importance of this could not be overestimated. Cheap gas was essential to meet competition, and would strengthen the position of the industry. The problem of the ash and moisture contents of coke was really a fundamental one. It was desirable, needless to say, to select coals of low ash content. With regard to washing, only the sizes recovered by screening were so treated; and the water soon drained away from the coke. It had been found in practice that washed coke was certainly preferred for use in domestic boilers and anthracite stoves. Mr. Booth had spoken of the average consumption of the domestic coke boiler. These boilers varied in size, of course; but he (the speaker) had found from his own experience, and from that of others, that 5 tons per annum could be regarded as an average figure. If every gas consumer took only half-a-ton of coke a year, the present supply would be inadequate to meet the demand. With regard to supplies of breeze, the present tendency was for gas undertakings to have more of this product for sale, due to grading and steaming and to the adoption of waste-heat boilers. Indeed, the creation of an adequate market for breeze was an essential preliminary to the installation of waste-heat boilers. When so-called breeze was screened, often as much as 30 p.ct. of coke nuts was recovered. Mr. Booth had raised the question of the output of boilers of the Lancashire type. He (Mr. Nicol) regarded 12,000 lbs. per hour as good working, for hand-firing.

Mr. Newton Booth: Our normal is 8000 lbs. per hour; and this cannot be maintained with coke.

Mr. Nicol said they could go up to 6000 lbs. with coke. If boilers were worked above this figure, it was possibly at the expense of efficiency.

Mr. Newton Booth: The efficiency of the boilers working at 12,000 lbs. per hour worked out at 78 p.ct., and the average efficiency for a whole week's running at 74 p.ct.

Mr. Nicol: With an output of approximately half, we can get an efficiency of over 80 p.ct. with coke firing, day and night.

Mr. Newton Booth: Your expression "day and night" implies a full night load. With the ordinary Lancashire boiler there is a difference of about 10 p.ct. between 9-hour full-load working and 24-hour full-load and off-load working.

Mr. Nicol said that his efficiency of 80 p.ct. referred to full-load and off-load average. Higher efficiencies could be obtained on short-time full-load tests. He went on to say that coke fuel should not compete with the cheaper grades of steam coal, but it could do so with the higher grades. Regarding Mr. Percival's point about the flue gas temperatures, there was no evidence of carbon monoxide in the flue gases when coal was being burned, which indicated that the air supply was adequate. Proper grading of coke was highly important. For smaller boilers ¾ to ¾ in. coke—sold as "nuts"—was best; while for larger boilers broken coke was preferable. Grading had a pronounced influence on the rate at which coke burned in the open grate. The maximum rate was attained with 2 in. coke. Vertical coke was dry, and was more reactive than horizontal coke, which was hard and dense. For slow burning in boilers, the latter was preferred; but where the boilers were worked at their maximum output, the vertical variety was better. The latter kind was also easier to ignite when employed in open firegrates, though horizontal coke burned satisfactorily in a grate specifically designed to consume coke—*i.e.*, with back and sides, and sometimes the hearth, of fire-brick. An excellent range for this purpose was made by Messrs. R. & A. Main, Ltd., and many others proved satisfactory. To his mind Dr. Owens' coke fire possessed unique features and was in a class by itself. On March 9 Dr. E. W. Smith would read a paper dealing with this question at the Royal Society of Arts.

Vote of Thanks.

Mr. Kerridge (Croydon), in proposing a vote of thanks to Mr. Nicol, said that the lecturer had not mentioned that coke was more or less used in the ordinary coal-fuel kitchen range. As a matter of fact, however, he (the speaker) had come across cases in his district where coke was being consumed in such ranges with every satisfaction. He was of opinion that the ousting of anthracite by coke for use in anthracite stoves offered a good field. There was room for improvement in coke boilers; and it would be a good thing if the front grate bars were positioned higher up the boiler, so that they did not become ashed-up.

The vote of thanks was seconded by Mr. Percival, who thought it might be advisable to leave more volatile matter in the coke for sale for use in open firegrates.

A Kinematograph Entertainment.

The meeting was brought to a close by the showing of an interesting film by the National Radiator Company. This illustrated the various phases, from start to finish, in the manufacture of the Company's coke-fired boilers.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

A Meeting of this Association was held at Swansea on Saturday, Feb. 12. The members were received by Mr. W. H. Johns, Engineer and Manager, who was supported by Mr. E. Ablett, Secretary, and were entertained at tea by the Chairman and Directors of the Swansea Gas Light Company. At the general meeting which followed, presided over by Mr. T. V. Blake, of Cardiff, the Senior Vice-President of the Association, the following paper was read.

GAS AS A FUEL FOR FISH AND CHIP RANGES.

By C. H. Collins, of Swansea.

There are in Swansea to-day no fewer than sixty shops solely devoted to the sale of cooked fish and potatoes. All these shops are registered by the Swansea Corporation, who have powers to satisfy themselves that all operations in connection with the business are carried out in a thoroughly hygienic manner. I am of opinion that this interests us materially, for if we can prove to prospective consumers that we have a proposition which is going to lighten their labour, and that their work is going to be carried out in an atmosphere free from smoke, dust, ashes, and all the troubles incidental to the use of solid fuel, we are well on the way to introducing gaseous heat. Our case can be strengthened if we can also prove that the adoption of gas is not going to add to their running expenses.

Co-operation.

The question of gaseous fuel for fish and chip cooking has not received the consideration it deserves, probably owing to the fact that coal-fired ranges did the work required of them in the majority of cases at any rate fairly successfully, and the users of them accepted the conditions as being the best available. Of late, however, knowledge of the convenience and usefulness of gas has been spreading; and as a result of the experience gained by the installation of a number of gas-heated ranges, the largest distributor of coal-fired fish ranges in Swansea and district has expressed his opinion that the

VERTICALLY CAST IRON PIPES

THE ONLY RELIABLE METHOD OF MANUFACTURE

BRITISH, FRENCH, AND AMERICAN STANDARDS

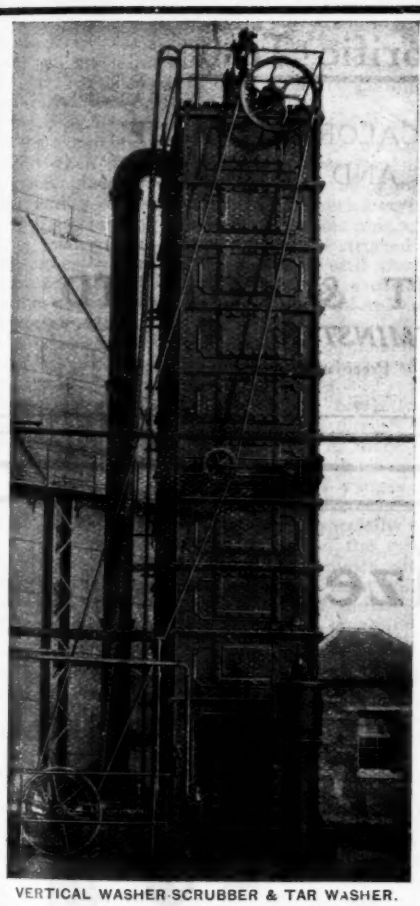
8 TO 10,000 TONS IN STOCK

SOCKETS, WEIGHTS, AND THICKNESSES VARIED TO ENGINEERS' SPECIFICATIONS.

A. G. CLOAKE,

54, HOLBORN VIADUCT, LONDON, E.C.

Telegrams: "AMOUR, LONDON."
Telephone No.: 1909 CENTRAL.



VERTICAL WASHER-SCRUBBER & TAR WASHER.

THE WALKER

VERTICAL AND HORIZONTAL

WASHER-SCRUBBERS

POSSESS DISTINCT ADVANTAGES

THE VERTICAL TYPE.

ELIMINATES AMMONIA & MOST OF THE CO_2 & H_2S.

HAS LARGE SCRUBBING SURFACE.

A TAR WASHER CAN BE FITTED IN BASE IF REQUIRED.

EXTRACT FROM A TESTIMONIAL JULY 1926.

"YOUR VERTICAL WASHER-SCRUBBER GIVES GREATER SATISFACTION THAN MY HORIZONTAL WASHER-SCRUBBER. STEAM IS REQUIRED IN THE HORIZONTAL MACHINE OR IT BECOMES BLOCKED UP, WHEREAS YOURS NEVER DOES."

C. & W. WALKER, LTD.,

DONNINGTON, near WELLINGTON — SHROPSHIRE.

LONDON OFFICE: 70, VICTORIA STREET, WESTMINSTER, S.W.1.

WATER GAS PLANT.

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED.

36, Victoria Street, London, S.W.

IF YOU KEEP A DOG

you need not do your own

— BARKING —

IF YOU HAVE A

SIMMANCE POSITIVE RECORDER

you need not make Calorific Tests

A GLANCE SHOWS YOUR ACTUAL CALORIFIC VALUE, WHICH IS ACCURATELY TESTED AND RECORDED.

SOLE LICENSEES: **ALEXANDER WRIGHT & CO., LTD.**

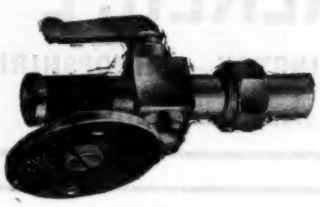
1, Westminster Palace Gardens, WESTMINSTER, S.W. 1.

Telephone: Victoria 1207. Telegrams: "Precision, Sowest, London."

We Specialize !!!

IN

GAS FIRE TAPS.



No. 152.

No. 83.

No. 154.

Prices Right! ***Quality Right!***

Finished in Polished Brass, Oxidised Copper, or Oxidised Silver.

May we quote you?

SAWER & PURVES

BRANCH OF METERS, LTD.

45 & 47, WESTMINSTER BRIDGE RD., LONDON. MILES PLATTING, MANCHESTER. RADFORD ROAD, NOTTINGHAM.

day of coal-fired ranges has passed, and the firm have now decided to recommend nothing but gas wherever it is possible to obtain a supply. The Swansea Gas Light Company have an arrangement with this firm whereby notification is given in all cases when a range has been sold; and the necessary work of fixing supply pipes to the apparatus is invariably carried out by the Gas Company's staff.

We are by this means able to ascertain whether the service to the premises is large enough to deal with the required consumption, and, by fixing the supply pipes between the meter and range, we can ensure that pipes of adequate size are provided right up to the point of combustion. Instances have occurred in which both service and meter have been large enough for requirements, but pipes between meter and range have been inadequate. I heard of a case in which a range had been connected to a ¾-in. service and a 5-light meter.

The importance of the business of fish and chip cooking can be measured by the fact that it is estimated that no less than approximately 5000 tons of fish and 12,000 tons of potatoes are distributed by this means weekly in England and Wales.

Cost.

Regarding the cost of cooking, the two essential items are fuel and fat; and as far as the information at my disposal goes, I am of opinion that the latter item is more expensive than the former. Fuel may cost anything from 8d. to 1s. 4d. per cwt. of materials cooked, but fat for frying will cost from 3s. to 6s. for a similar weight. This point has a direct bearing on the kind of fuel used; and I shall endeavour to show that a considerable saving can be obtained by the use of gaseous instead of solid fuel.

When coal fires are employed, the heat must be maintained from the commencement to the close of operations. During the time when business is slack, a great amount of evaporation takes place. Though fires may be damped-down, the large quantity of heat retained in the brickwork usually built into and surrounding the firebox ensures this. Compare this with a modern gas-heated range, constructed without fire-bricks, whereby the gas can be lowered during the slack periods, and yet be instantly available as occasion demands. A further point is that a number of coal-heated ranges have no arrangements for draining-off the fat from the food cooked; and in consequence quantities of fat are handed out to the purchaser with his goods. This, of course, is absolute loss to the frier; also it cannot please customers.

This fault has been eliminated in correctly-designed gas ranges, the surplus fat being drained directly back into the frying pans. Consequently the food is more appetising. I have heard it said that gas will not cook as quickly as coal; but this is not correct. Modern gas ranges will cook as rapidly as coal ranges. Of course, there is a limit to the speed at which frying can be done, especially with potatoes; and this depends to a large extent on the type of potatoes used. Those grown on heavy soil require more heat, and absorb more fat than those grown on light soil. As regards gas heating, it is only a question of burner power and a plentiful supply of gas.

Gas Saves Labour.

I believe it is possible to demonstrate to the fish frier that the adoption of gaseous fuel is a factor by which he will be able to lighten his labours and bring a little more ease into his life than hitherto. Under coal firing conditions he has two fires to light, usually twice daily—once for the mid-day trade, and again for the evening trade. If he decides to damp-down during these periods, an irrecoverable loss occurs, to the detriment of his business. Coal has first of all to be brought into his store, and afterwards carried in small quantities into his shop, for use in the furnaces, as no provision is usually made for storing coal in the shop. Kindling wood, of course, has to go through the same process. After the fires are lighted, results may be variable, owing to flue conditions, direction of wind, &c. It is necessary to maintain full heat right up to the time of closing. This means that fires must then be drawn, with consequent dirt and discomfort. Ashes must be cleared away, flues regularly swept and cleaned, and occasionally repairs have to be carried out to brickwork and firebox. I am sure you will agree that this is very far from an ideal state of affairs, apart entirely from the fact that coal dust and ashes are not exactly pleasant additions to fried fish and chips. With gaseous fuel all these unpleasant conditions are entirely eliminated; the heat needed being supplied by the turn of a tap, as flexible as required and adapting itself to the needs of the moment silently and without labour to the user. I think that the foregoing is sufficient to prove that all the advantages lie with gas, and all the disadvantages with coal.

The next point we have to consider is the expansion we may reasonably expect by the installation of gas-heated ranges. I have made careful investigation, and find that, taking an average of the existing gas ranges in Swansea, the weekly consumption of gas is 6000 c.ft. per range. This represents an annual consumption of approximately 300,000 c.ft. per range, so that if we can accomplish our ideal—that is, replace all coal-heated ranges by gas ranges—we shall increase our output by 18 million c.ft. per annum, as there are at present sixty registered fish and chip shops in the administrative area of Swansea.

Existing Coal Ranges.

We have to consider what shall be done with the existing coal-fired ranges. Shall we recommend conversion to gas, or shall we advise their replacement by gas ranges? Here the question of first cost enters largely, but is not entirely the deciding factor, as it is possible to make a conversion at a comparatively small cost, which may in the long run prove more costly than the installation of an entirely new range. I have converted one or two ranges to gaseous heating, and I have not been perfectly satisfied as to efficiency and economy of gas consumption. If one did all that was necessary to make a converted range yield an efficiency in any way comparable with a gas range, then the cost would be such that it would be better to spend a little more money and have the gas range at once.

The average fish frier is usually prepared to spend (say) £7 to £10 for converting, but seldom more; and of course he expects to get results at least equal to those obtained by his coal-fired range. In conversions, several difficulties occur; and I should like to instance one or two. Unless your customer is prepared to allow brickwork, firedoor, &c., to be cut away, it is necessary to get all your burners into a space no wider than that occupied by the furnace door, this being usually about 10 in. wide by 6 in. high. The question of up-cast in the flue requires careful consideration, as we must not have too much draught, which will have the effect of carrying valuable heat up the chimney. At the same time there must be sufficient secondary air to maintain complete combustion. Owing to the small space in which we have to put two or three very powerful burners, it is usually difficult to get this necessary secondary air into the confined space between the burners and the bottom of the pans, to prevent the flames floating and, in some instances, completely smothering. I have seen this happen in one or two cases. Another point which has an adverse effect on economy of gas consumption is the great amount of brickwork in which solid fuel ranges are usually built. This, of course, absorbs a large amount of heat which should be usefully employed in heating the pans. Further, the pans themselves are usually constructed of cast iron of varying thickness, which is not conducive to a quick transference of heat from the burners to the fat. Summing up, I am of opinion that, to get complete satisfaction, it is better to recommend the substitution of a coal-fired range by a gas range. It is, of course, necessary to emphasize that, in recommending gas frying ranges, only those of a thoroughly efficient type should be adopted. Several manufacturers have specialized in apparatus of this kind, and are producing ranges which conform to our requirements in this direction.

Provide Adequate Piping.

It is a good plan to instal pipes of a size larger than actual requirements suggest. Work out the capacities carefully, and then specify one size larger. There must be ample heating power under perfect control, and all burners must be fitted with both gas and air adjusters, to ensure a perfect mixture. Some adjusters I have seen have not by any means been capable of this function. Provision must be made for keeping the food hot without its becoming steamed, and there must be arrangements for recovering the fat brought away from the pans by the cooked food. The pans should be constructed of sheet steel, to obtain as rapid a transference of heat from the burners as possible. The whole range should be made of the plainest possible construction, to facilitate cleaning; and all parts should be detachable, to assist in this.

Handiness of operation is also important, as the demand is fluctuating and the operator has often to work at high pressure during rush hours. I do not think that any brass or copper ornamentation should be embodied in the construction of these ranges, for, unless scrupulous cleanliness is observed, these metals are apt to set up verdigris.

Efforts should be made to line the body and all parts of the range with non-conducting material, as a large amount of heat may be conserved in this way. From experiments, it has been ascertained that, in a properly constructed gas range, two pans 27 in. by 21 in. will cook 40 pieces of fish and 1 stone of potatoes, with a minimum of 3 in. of fat in the pans, in 8½ minutes; this being the full capacity of the pans at one fry. The gas consumption worked out at 85 c.ft. of 450 B.Th.U. gas per pan per fry.

Another example supplied by a consumer is: Cost of gas for cooking 1 ton of potatoes and 18 stones of fish, £1 8s.

The advantages claimed are that operations can be commenced in a short time after lighting up. Fries come off in a quicker time than when solid fuel is used, the saving in oil is considerable, chips come out drier, the shop is never overheated, and decorations last longer. A woman can manage the business with gas, but with coal a man must be employed to maintain heats. When a new issue of potatoes is placed in the pan, far less chilling of the oil takes place, owing to the margin of heat at the frier's disposal.

Discussion.

Mr. B. J. Bell (Cardiff), in proposing a vote of thanks to Mr. Collins for his paper, opined that the 18 million c.ft. per annum in-

creased consumption to be obtained by the conversion of all the coal heated ranges in the Swansea area to gaseous fuel should receive close attention. The frying of fish and potatoes by gas was desirable not only from the aspect of efficiency, but from the point of view of the person using the range. The carbon deposit created at the bottom of the pan by over-heating in coal-heated ranges was a decided disadvantage. There should be even temperature. Though, perhaps, the actual cost per cwt. of food cooked was slightly higher when gas was used, when the saving in fat was considered the consumer was more than compensated for the slight extra fuel cost.

Mr. A. H. Shepherd (Swansea) seconded the vote, and said that fish and potato frying by gas was more or less an unexplored field.

The Chairman asked the author whether he had ever fitted automatic control to the gas supply.

Mr. E. Ablett (Swansea) asked whether the quicker frying by gas did not have a tendency to reduce the smell.

Mr. W. H. Johns remarked that gas-heated ranges for fish and potato frying in Swansea were giving entire satisfaction, and the business was growing. With gaseous heating there was undoubtedly a considerable reduction in the evaporation of the fat.

Mr. J. W. Hearson (Pontardawe) asked whether or not it was advisable, when for some reason or other one was unable to convert the solid fuel ranges to gas, to advocate the use of coke. When converting from solid fuel to gaseous fuel, could a ring burner be arranged to "spread" over the bottom of the pan?

Mr. E. R. French (Swansea) asked what type of burner Mr. Collins considered the most suitable when converting coal ranges to gas firing. How did he obviate the loss of heat through radiation? Were any of the modern gas ranges fitted with thermostatic control, to prevent the fat from over-heating? It might be advisable to supply gas ranges on the hire-purchase system.

Mr. F. Osborne (Cardiff) advocated the use of coke in place of coal for those ranges burning solid fuel. Had Mr. Collins any comparative costs of coke and coal for this purpose?

Mr. J. Cunliffe (Swansea) asked if calorific value of the gas affected the fuel costs.

Mr. W. H. Johns remarked that in Swansea they did not advocate the use of coke for fish frying. Their primary object was to push the sale of gas for this purpose, and thus increase the sale of gas per mile of main.

Mr. Collins, replying to the discussion, said he had no experience of thermostatic control of fish frying. It was a fact that with gas ranges the smell was largely eliminated, not only by the quicker frying, but because the ranges were better designed, with proper hood and flue outlet enabling the steam created to get away quickly and properly. As regards the conversion from solid to gaseous fuel, he had tried three types of burner, but had found it practically impossible to get full efficiency. There was too much local heating; and, as they knew, the heat was required to spread evenly. There was also the loss of heat through radiation, owing to the large amount of brickwork in ranges built for solid fuel. To make a complete success of this branch of gas supply, it was necessary to have properly constructed gas ranges. He was in favour of supplying them on the hire-purchase system. His Company were already doing so in one instance. He could not give any details of the cost of using low-grade gas, as in Swansea they only supplied high-grade gas.

Congratulations were extended to Mr. F. Harvey, of Abertillery, on his appointment to the sales staff of the Cleethorpes Gas Company.

On the proposition of Mr. F. Osborne (Cardiff), seconded by Mr. W. E. Crowley (Newport), a vote of thanks was passed to the Chairman and Directors and management of the Swansea Gas Light Company for their hospitality.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Case of the Isolated Student.

Sir,—The important questions which Mr. Coe raised in your issue of the 16th inst, and whose letter was endorsed by Mr. J. F. Tyndall, of Deal, in your last number, under the above heading—namely, the real provision of facilities throughout the country for the training of the gas student in ancillary subjects—constitute one of the items on the agenda for the conference of the Advisory Committee with the representatives of the Junior Gas Associations to be held on March 9, where it will be dealt with authoritatively.

(Signed) Walter Hole,
Organizing Secretary, Education Scheme.

Feb. 26, 1927.

Institution's Education Scheme.

Sir,—I have followed closely, and with great interest, the correspondence on the above subject. There is, however, another aspect of this matter that I have not seen publicly presented before, and which has a very definite bearing on the number of students coming forward to enrol under this scheme. Briefly it is this: The gas engineering profession, in comparison with other like professions, is peculiarly constituted, in that each undertaking is virtually a limited monopoly, officered by very few technical and administrative men (relative to the number of the rank and file and the quantities of raw material handled), whose function it is to control the whole of the manufacture and distribution in any one area, which may embrace several towns, and amount in the aggregate to many square miles. This fact is responsible for the difficulty in forming classes; for at best any one undertaking would probably not be in a position (outside the Metropolis) to provide more than two or three prospective students, the provision of classes for whom would be clearly not remunerative. Moreover, there are a large number of medium-sized and small works which would normally have students for the minor courses, but none for the courses under Section I. The point I try to make is that the gas industry is so entirely different from other industries—such as textile, ceramic, mining, electrical, &c.—where there are, in their several centres, so many students collected together that the provision of classes is a matter of course.

I think that the question of attendance at recognized classes is the rock on which this excellent scheme has split, for the reason stated above; and I am of opinion that considerable modifications are necessary to save it from complete disaster. The most important are:

(1) A relaxation of the requirements as to attendances at approved technical colleges or (under Section II.) the production of national certificates.

(2) A "tightening-up" of the regulations requiring candidates to produce a certificate to the effect that they are actually engaged on the technical side of the industry (apparently not required under the present scheme for the Ordinary Certificate).

In this matter it might be well to follow the lead given by the Institution of Civil Engineers, who say to their candidates, in effect: "Provided that you fulfil our requirements as to pupilage, &c., with a corporate member (on which they are adamant), and can pass our examinations, we do not care where you get the knowledge."

There are many young men occupying responsible positions in the industry whose knowledge and experience is unquestionable, but who are debarred from taking the Diploma by the restriction that it is only open to those who have a number of elementary certificates. It is, of course, possible for them to obtain these certificates. However, "all things are possible, but some things are not expedient," and it certainly is not expedient that a man who holds a responsible position should waste his time, and possibly that of the undertaking which employs him, by taking these minor examinations. To meet these special cases, I would suggest that the following qualification should be added to those on p. 16 of the "Green Book:"

> or (*e*) who hold a responsible position on the technical side of gas engineering and/or supply, which pre-supposes an adequate knowledge of gas engineering and/or supply, and who are so engaged at the time of making their application; and who have completed their thirtieth year.

I leave the rest to the judgment of the examiners, who can safely be relied upon to prevent any lowering of the standard.

No one denies that the industry has a great future, and will require a steady influx of men of undeniable qualifications to direct it. That is one thing; but there appears to be a movement on foot which would organize a special campaign to encourage students to come forward. Is the student who requires a campaign to encourage him worth his salt? Before any mass production scheme of embryo gas engineers is put into force, should we not pause a moment and ask: "Where are we going, and what is the absorptive power of the industry for these prospective neophytes?"

George le B. Diamond.

Hove,
Feb. 22, 1927.

Aldershot Gas, Water, and District Lighting Company.—The tenders for the £50,000 5 p.ct. perpetual debenture stock which Messrs. A. & W. Richards offered on behalf of the Directors of this Company were opened on Feb. 23. The issue was largely oversubscribed at prices ranging from £100 down to the minimum £93 p.ct.; the average price obtained being £93 11s. 7d.

Gas Lecture at Leamington.—On Thursday, Feb. 17, Mr. Frank Ayre, of the Parkinson Stove Company, Birmingham, gave an interesting address at a well-attended meeting at the central showrooms of the Leamington Priors Gas Company. Mr. Ayre described the services rendered by the gas industry as regards lighting, heating, cooking, and the provision of hot water in connection with the Government housing schemes which were commenced after the Armistice, and dealt with the provision of reliable lighting fittings under prepayment meter installation schemes. The lecturer explained how the gas register grate was gradually replacing the bedroom coal grate. He dealt with the construction of gas fire flues and the economy which could be effected by means of these. The comparative merits of gas-fired and coke-fired boilers were next considered, as also were "builders sets" and geysers specially constructed for use in hard-water districts like Leamington. Mr. Ayre went into the respective merits of wash-boilers manufactured on different lines, and described the various ways in which such boilers could be used for providing hot water for baths. The lecture was illustrated by appliances, complete and in section, manufactured by Mr. Ayre's firm, the Parkinson Stove Company.

REGISTER OF PATENTS.

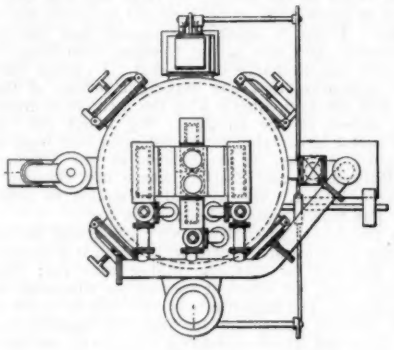
Gas Producers.—No. 263,932.

DAVIDSON, T. M., of Hatch End, and PATENT RETORTS, LTD., of Norfolk Street, W.C. 2.

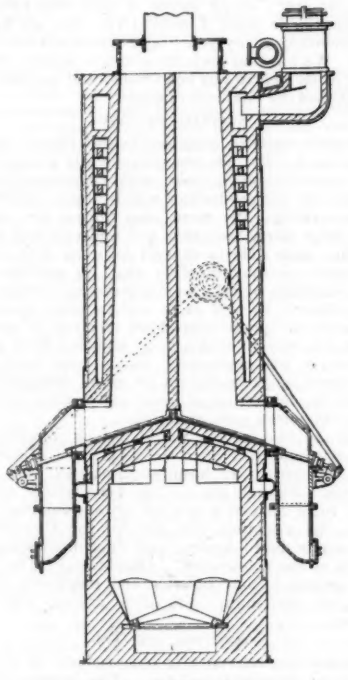
No. 24,813; Oct. 5, 1925.

This invention relates to gas producers of the type in which complete gasification of coal, &c., is effected in a combustion chamber situated below a preliminary distillation retort which is heated by blow gas in a surrounding jacket.

The patentees point out that it has before been proposed in a gas producer comprising pairs of retorts, with combustion chambers beneath, disposed in the same setting, to provide a centrally disposed retort for drying the fuel between each pair of retorts; the additional retort extending downwardly between the combustion chambers of the respective carbonizing retorts, and being provided with lateral discharging means in position below the combustion chambers.



Plan.



Sectional Elevation.

Gas Producer with Carbonizing Unit.—Patent Retorts, Ltd.

According to the present invention, a supplementary retort or retorts, for the carbonization of charges of coal by the utilization of the heat available in the setting, is or are provided in position between a pair of retorts into which the coal is charged that is eventually completely gasified on its passing into the combustion chamber beneath. The supplementary retorts are disposed wholly above the combustion chamber, and means are provided in position above the combustion chamber to permit of the lateral discharge of the carbonized residue. Such supplementary retort or retorts may conveniently be provided within the setting in a position between two preliminary distillation retorts that discharge into a common combustion chamber disposed beneath the setting.

Among the objects is to provide a construction of producer that is efficient in the utilization of the available heat, and in which the latter is utilized for the carbonization, in addition to the charge that is utilized for complete gasification in the manner described.

We reproduce two drawings from those which accompany the specification. The chief claims appended to the latter are as follows:

1. A gas producer of the type specified in which a supplementary retort or retorts (for the carbonization of charges of coal or other carbonaceous substances by the utilization of the heat available in the setting) is or are provided in position between a pair of retorts into which the coal or other carbonaceous substances is charged that is eventually completely gasified on its passing into the combustion chamber beneath, the supplementary retort or retorts being disposed wholly above the combustion chamber and means being provided in position above the combustion chamber to permit of the lateral discharge of the carbonized residue from the supplementary retort or retorts, substantially as described.

2. A gas producer as specified in Claim 1, in which means are provided in the arch or roof of the combustion chamber by which the supply of secondary air may be preheated.

3. A gas producer as specified in Claim 1 or in Claim 2, in which means are provided for the extraction of the carbonized residue from the supplementary retort or retorts.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 16.]

Nos. 3362—4006.

ALLEN, W.—"Stands for gas irons, &c." No. 3718.
ASHWORTH, W.—"Gas-heated wash-boiler." No. 3658.
CARPENTER, C.—"Gas mantles." No. 3703.
COLEMAN, F. S.—"Automatic gas regulators." No. 3852.
COOPER, C.—"Treatment of gases arising from distillation of coal, &c." No. 3913.
DENNY, C. E.—"Gas lighter." No. 3548.
GENERAL GAS APPLIANCES, LTD.—See Coleman, F. S. No. 3852.
GOODMAN, S. A.—See Denny, C. E. No. 3548.
HENSHAW, D. M.—"Apparatus for bringing liquids and gases into intimate contact." No. 3467.
HOLMES, P. F.—See Henshaw, D. M. No. 3467.
HOLMES & CO., LTD., W. C.—See Henshaw, D. M. No. 3467.
HUNT, A. E.—"Safety gas tap." No. 3637.
POTTERTON, A. B.—"Gas-heated boilers." No. 3801.
POTTERTON, T.—See Potterton, A. B. No. 3801.
POTTERTON, T. F. C.—See Potterton, A. B. No. 3801.
SALERNI, P. M.—"Apparatus for distillation of carbonaceous materials." No. 3565.
SELAS AKT.-GES.—"Gas-burners." No. 3786.
SOMERVILLE, J. M.—See Carpenter, C. No. 3703.
SOUTH METROPOLITAN GAS COMPANY.—See Carpenter, C. No. 3703.
SOUTH METROPOLITAN GAS COMPANY.—"Heat-insulating devices." No. 3704.

[Extracted from the "Official Journal" for Feb. 23.]

Nos. 4007—4772.

CHANDLER, D.—"Gas fires, &c." No. 4627.
EVANS, E. V.—See Chandler, D. No. 4627.
GOUTAL, E.—"Apparatus for charging gas producers." No. 4367.
HENNEBUTTE, H.—See Goutal, E. No. 4367.
KIRKE, P. ST. G.—"Multiple-jet gas burners." No. 4129.
KROMSCHRODER AKT.-GES., G.—"Gas meters." No. 4399.
LAMBERT, G.—"Prevention of fire in gas scrubbers, &c." No. 4251.
LUCAS, E. E.—"Burners for gas-heated furnaces." No. 4693.
MCINDOE, R.W.—"Prepayment mechanism for gas meters, &c." No. 4319.
SALERNI, P. M.—"Distillation of carbonaceous materials." No 4499.
SMITH, E. W.—"Lubrication of gas meters.' Nos. 4115, 4116.
SMITH METERS, LTD.—See Smith, E. W. Nos. 4115, 4116.
SOUTH METROPOLITAN GAS COMPANY.—See Chandler, D. No. 4627.
TAUNTON, R. P.—See McIndoe, R. W. No. 4319.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS

Progress of Bills.

Commercial Gas and Scarborough Gas (Consolidation) Bills: The further Standing Orders applicable to these Bills have been complied with.

Commercial Gas, Scarborough Gas (Consolidation), and Salford Corporation Bills: Read a second time, and committed.

Petitions against Private Bills.

Petitions have been deposited against the following Bills: Bognor Gas and Electricity, by the Arundel Corporation and the Littlehampton Gas Company; Commercial Gas, by the London, Midland, and Scottish Railway Company; Scarborough Gas Company (Consolidation), by the London and North Eastern Railway Company; Wessex Electricity, by the Aldershot Gas, Water, and District Lighting Company; Croydon Corporation, by the Wandsworth, Wimbledon, and Epsom District Gas Company.

HOUSE OF COMMONS.

Progress of Bills.

West Bromwich Corporation Bill: Read a second time, and committed.

Engineers' Bill.

A Bill "to provide for the registration of, and to regulate the qualifications of, engineers," was presented by Mr. Herbert Williams on Tuesday, Feb. 22. The Bill is supported by Sir Martin Conway, Rear-Admiral Sueter, Colonel Sir Alan Burgoyne, Mr. Clarry, and Mr. Bird.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

ORDINARY AND EXTRAORDINARY GENERAL MEETINGS.

The Ordinary General Meeting of the Proprietors of the Company was held at the Cannon Street Hotel, E.C., last Wednesday afternoon—Dr. CHARLES CARPENTER, M.Inst.C.E., in the chair.

The SECRETARY and ACCOUNTANT (Mr. Frank Day) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting. Thereafter the seal of the Company was affixed to the "Register of Proprietors."

THE ADDRESS OF THE PRESIDENT.

The PRESIDENT, on rising to address the meeting, said: Ladies and Gentlemen,—In moving the adoption of the Directors' report, I propose to follow the course customary at these meetings of using it as the basis of the remarks I desire to make. In the first place, let me say, the results of the year's working have not been disappointing. By that I do not mean that we can by any means describe the past year as a prosperous one, but rather that in it we have held our own. I might even say we have done more, in very trying and unusual circumstances. There are three informing tests of success applicable to any business. First, has it gained in volume; secondly, has it increased its customers; and, thirdly, what has it earned? I will deal now with the first two points.

GAS SUPPLY TO SOUTH LONDON.

The gas supply to South London is mainly a service based upon necessity, rather than of luxury. Although theoretically it ought not, therefore, to be greatly influenced by enhanced prices, the fact is incontestable that these invariably do check gas consumption, while by falling ones the use of gas is stimulated. As one result of the coal strike, we had to raise our charges during the second half of the year by an average of rather less than 15 p.ct. South Londoners' pockets are not sufficiently elastic to meet, without economizing, such an extra strain upon their resources; for, in a great number of instances, the amount allocated to gas is a definite proportion of the weekly budget. Then, too, there was the restriction in shop lighting. In this connection, it should be borne in mind that whatever be the form of lighting favoured by tradespeople within their shops, there is no uncertainty about their award of the palm to gas lamps as a means of attracting customers to visit them. Our high-pressure lighting services provide the most pleasing—I might even say beautiful—form of outdoor illumination; and the after-dark appearance of the important shopping centres south of the Thames is more suggestive of Oriental brilliance and charm than of the drabness too frequently associated with their busy thoroughfares and streets. These two circumstances account fully for the fact that I am unable to report any actual increase in the gas sold over the last twelvemonth.

INCREASED NUMBER OF APPLIANCES IN USE.

But if gas consumption has remained on the whole stationary, a substantial increase has taken place, not only in the number of consumers, but in the quantity of appliances in use. As regards the latter, this would have been greater still, but for the check upon sale and hire of apparatus imposed by the shortage and high price of manufactured iron. The popularity of gas coppers and bath-heaters is continually extending; and they can be fixed at any suitable position in the house to which a gas pipe can be led. I may remind you than an important branch of our sales organization is devoted to the design and improvement of gas-using appliances, not only industrial, but domestic. While these are mainly for use in our own area of supply, their usefulness is evidenced by the fact that they find their way into other parts of London, and, indeed, the country beyond. The turnover of our gas fittings business showed a substantial increase over the previous year. It is becoming more and more essential to provide that the many possibilities of gas shall be available for use by the public. The problems involved in warming the human body and the apartment in which it lives, are quite different ones; and our physical laboratory has been conducting some very interesting investigations as to which are the best kinds of energy rays from a therapeutic point of view. I may also mention that the new so-called log-fire we showed last year at the Ideal Home Exhibition has met with a success quite beyond our anticipations.

THE TWO GREAT STRIKES.

I now come to deal with the subject which, more than anything else, has dominated the Company's operations during the last year. I refer to the two great strikes. I have often regretted from this chair the wastefulness arising from having to lay down large stocks of coal for no other purpose than to provide against these outbursts of industrial unrest. Not only do we have to spend large sums in re-handling the coal thus purchased, but it never produces such good results, either of gas or of bye-products, as freshly wrought material. We had once more to face this contingency in the early spring of last year, providing for the emergency nearly a quarter-of-a-million tons, or one-fifth of our total yearly consumption. But it soon became evident that even an extreme provision of this kind would not see us through the continuing difficulty. Fortunately, we were led to turn our thoughts to American rather than Continental coal; and of this quality we purchased something like 800,000 tons, the remainder of our requirements being made up from various parts of Europe. I am bound to say that our dealings with America were highly satisfactory; there being no disposition to take any advantage of our industrial troubles. And had it not been for the shortage of freight when other buyers in increasing numbers looked across the Atlantic for their supplies, we should have got through with no other handicap than that of unloading, which threatened to be our one great difficulty. The American coal was carried in steamers not only very much larger than those normally serving the Company, but more suited to carry grain or general cargoes; and it was evident that but a small proportion of these could be cleared at the unloading piers and jetties in ordinary use. Fortunately, every help was given to us by the authorities, who by this time must have realized, even if they did not earlier, that the great strikes had a deeper origin than a mere industrial dispute.

We received invaluable aid from the Board of Admiralty, by whose courtesy there were placed at our disposal the special facilities installed both at Portsmouth and Sheerness for the coaling of warcraft. But for this timely and great assistance, our position would have been very difficult; for every possible means of discharge on the Thames was taxed to the utmost by large users of coal. You will be interested to know that at no time did we have less than 36,000 tons in store. There is another important fact that I must not forget to mention, and that is the freedom from labour troubles in connection with the discharge of the coal. I cannot but think that this was an indication that one important section of the industrial community was not sympathetic with the attitude of those who were leading the miners in the struggle. We found our own fleet of colliers very useful in carrying the transhipped coal from the two seaports mentioned, as well as the balance of our requirements from Hamburg, Rotterdam, and Stettin, where our German and Polish purchases were loaded. We were also enabled to help some half dozen other gas undertakings wholly or in part.

In quality the American coal was very good, and its freedom from ash was strong evidence of the care with which it is mined or cleaned. Its yield of gas and tar was also higher than that from our own North Country coal, for which it formed an admirable substitute in the circumstances. The importance of this will be realized when it is remembered that its suitability for our use depends upon its gas-making qualities, not its steam-raising ones, as in the case of a power station. In the latter, anything that will burn will produce steam. Our gas consumers, therefore, obtained right through the strike the fullest value for every single therm of gas they paid for; and this is not less remarkable when I remind you that we have never used, except experimentally many years ago, water gas as a supplement to our coal gas. We have no prejudices in this matter; it is simply that it does not fit in so well to our conditions, and we have, therefore, no apparatus installed for its manufacture.

SUPPLIES OF COKE.

We have sometimes been criticized in this respect by others not so fortunately situated. But we are conveniently placed on the Thames to carry on a good trade in coke with Continental customers, who take the surplus in our production which might otherwise have to be used for gas making. We were also during the stoppage able to assist no less than thirty-one other gas undertakings with supplies of coke which they were able to convert into gas with their carburetted water gas plants. I may mention that, in addition, we furnished considerable quantities of coke to the pumping stations of the Metropolitan Water Board, as well as to various other essential industries. Many expressions of appreciation were received by us from our coke customers for the way in which their supplies were maintained; for they, too, like the gas companies, would have been inconvenienced had we not been large producers of coke throughout the trouble. They, too, had the advantage of lower ash content resulting from the quality of the imported raw material.

My story of the two strikes would not be complete without some reference to what happened when the supply of fuel during the general stoppage was threatened to hospitals, bakeries, and other food-producing concerns. Though the cartage contractors' employees (can I say "joined" to an act which was not always voluntary?) participated in the strike, the situation was met by the Company's employees driving our own or hired lorries, and thus maintaining some of the essential needs of the community. [Applause.] The fullest measure of praise is merited by our officials and employees for their admirable handling of the many difficulties arising during these very troublous times.

AMMONIA AND TAR.

I must complete my reference to bye-products by saying something with reference to ammonia and tar. The former, once a valuable source of income, has now fallen so low in value that its contribution to reducing the selling price of gas is exceedingly little. Indeed, I believe that in many small undertakings its extraction can now only be carried on at a loss. The production of sulphate of ammonia at gas—or coke oven—works scattered over the country, must always be one of small scale compared with the undertakings exploiting, and on one large establishment, its synthetically produced competitor. It is pretty certain that in our own works, handling over one-and-a-quarter million tons of coal per annum, considerable readjustments of our methods of working up ammonia will have ere long to be undertaken. These, I may say, are subjects of consideration and experiment to-day.

Tar, on the other hand, is "suffering" from a boom in price, resulting from the enormous shrinkage in production brought about by the shutting-down during the strike of the metallurgical coking ovens and the very general substitution of water gas for coal gas, to which I have already alluded. Something of the same kind happened in 1920, when the high prices charged for coal tar resulted in an increased use of imported and artificial bitumen for road-making purposes. We are not going to be a party again to so unsound a policy, and are quoting prices which will allow of the continued use of tar both for macadamizing and briquetting. We have been

criticized for breaking the market, and not obtaining for our tar products as much as we could. But we depend to-day so much upon our returns from tar, that it is our bounden duty to do all we can to assist the stability of the industries using it, so that our customers may be able to rely upon a constant supply at reasonable prices of the raw material on which they depend. When the prices of pitch or creosote, or other tar products, are raised beyond their economic value, every effort is made to replace them by substitutes, and to our disadvantage in the long run. I do not think I need here say more on what is so obviously an unsound policy.

CO-PARTNERSHIP.

I now turn to the paragraph in the report dealing with a recent development of our co-partnership. If you think this looks rather long in comparison with other matters commonly regarded as the most important ones in industry, I think I need only refer you to the events of the past year to convince you that the consideration given to the welfare of our employees must have proved a great asset in the conduct of our business. Consider for a moment one circumstance which occurred nearly a year ago, when, next door to one of your gas-works, where every man remained at his post, every man from the adjoining electric power station walked out, and in his place there marched in a naval rating, with his bag and baggage, to run the deserted plant. Gas undertakings have been—and, indeed, are still—frequently regarded as antiquated and old-fashioned in their methods; but with few exceptions their attitude to their employees has been a sympathetic and helpful one. As far back as 1842, this Company constituted a fund to provide sick benefits by mutual contributions from itself and its employees; and in 1855 a Superannuation Fund was founded on similar lines. In 1911, when the State imposed its scheme of compulsory Health Insurance, our people pleaded hard to be allowed to contract-out of its provisions, in a manner similar to that obtaining in regard to Accident Insurance which has been so successfully dealt with by us under contracting-out schemes. Our request was not granted; but we were allowed to reconstitute our Sick Fund to suit the requirements of the Insurance Commissioners. In 1920, State insurance against unemployment was made general; and, although our efforts to contract-out were again futile, we were enabled, by arrangement with the Ministry of Labour, to provide unemployment benefits in substitution for those otherwise payable at the Employment Exchanges. In 1921, our Employees' Superannuation Fund was revised and remodelled to suit the altered conditions of to-day as regards wage values. Not for the first time, private enterprise proved in advance of the State. Three years later, the State scheme of insurance was extended to provide old-age pensions at 65 and annuities to widows and orphans.

After consultation with our employees, we decided again to raise the question of contracting-out, and of merging the existing funds for sickness, unemployment, and superannuation into one on the so-called "all-in" principle. Once more negotiations were opened up with the authorities, and this time with success. Our normal staff is mainly a permanent one; and although we have to supplement it from time to time to meet special requirements, we do all we can to avoid heavy seasonal fluctuations. Generally speaking, for instance, the winter months constitute the season for production and supply; while the summer ones are more devoted to repairs and upkeep. So that there exists a large nucleus body of co-partners possessing all the requirements for the successful working of an "all-in" scheme. Under it the benefits it provides will be substituted for those given under the State scheme. I think that I may sum-up the advantages when I say that the benefits will be greater and the cost less; while adequate provision has been made for those who, leaving our service, automatically take up State benefits and make State contributions. We have thus achieved, acting for and with the fullest support of our employees, the administration of our own funds on the true co-partnership principle; and in my opinion there is a great prospect of a successful future for their new constitution.

Not the least important development has been the remarkable manner in which the spirit of co-partnership has proved its complete compatibility with first one provision and then another imposed upon industry by the Legislature. Through it we have been enabled to take the statutory conditions and, freeing them from their inflexibility, apply them to the everyday conditions of the lives of our employees. I believe our scheme will be of far-reaching importance, not least as an endeavour to formulate means whereby individual effort may act as a substitute for official control. These proposals, which have been of a highly-involved and technical character, could never have been carried to a successful issue had it not been for the sympathy given to our efforts by those in authority. We have had the greatest consideration, assistance, and courtesy given to our representatives by the Government Actuary and the other principal advisers of the Ministry of Health throughout the complicated negotiations inseparable from so novel an undertaking. In saying this, I must not omit making a not less necessary acknowledgment—namely, to our Mr. Henry Lesser, but for whose tact, patience, and resourceful ability the scheme might never have been transformed from nebulosity to solidity. ["Hear, hear."] His guiding inspiration has been—as, indeed, of every one of us in these matters—that of true co-partnership, which is, after all, but another name for doing our duty as citizens of the State. It is a fruitful theme, and one upon which I should like to dwell at greater length than is possible here this afternoon. After 36 years of co-partnership, it is a very remarkable fact that our employees' desire is to strengthen, rather than to lessen, the bonds which, in our instance, bind Capital and Labour together in one united whole. [Applause.]

FINANCIAL RESULT.

The next matter to which I must refer is that of our dividend. I had hoped it would be greater; but the events of 1926 have been too much for us. As it is, we have drawn £98,000 from the fund specially authorized by Parliament to meet such contingencies as those through which we have passed. You will remember that, under our new constitution, three-fourths of our surplus profit goes automatically to the consumers by way of reduction in prices, and the remaining one-fourth we are entitled to divide equally between the shareholders and employees. The sum allocated is not the greatest we could have shared, but it is the most that we considered justifiable in the circumstances. Of our agreement with the South Suburban Gas Company I shall speak fully at the subsequent meeting.

PERSONNEL OF THE BOARD.

As regards the personnel of the Board, I should like to add my testimony to the words of the report recording the death of Mr. John Mews. Like his father before him, he was greatly attached to the undertaking, and took a great interest in its development. He came among us as a staunch supporter of the principle of extending to the employees representation on the Board. He never regretted his adherence to that principle; for he saw that it was a valuable contribution to the endeavours of the Company to find the most complete solution possible of the labour problem. We shall greatly miss him at our counsels. His successor, Mr. F. McLeod, is so well known to all of you that I need say little about his acceptance of a share in those responsibilities of management with which he has been so long and so intimately acquainted. He has brought to our consultations a logical mind and a well-balanced judgment, both of which qualities will not lose in usefulness by being transferred to another sphere of action. His re-election, and that of Mr. Paddon, will come before you later on in the meeting.

I must not omit to express my great regret that Mr. George Fry has found it impossible to continue to act as one of our Auditors. His experience in the accountancy of the Metropolitan Gas Companies has been a very extensive one, and I look upon his leaving us as a great loss. We are fortunate in the candidature of Mr. John Fry, whose experience has been gained in similar capacities to those of his brother. I have now much pleasure in moving:

> "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The VICE-PRESIDENT (Mr. Frank H. Jones): I beg to second the resolution.

Th PRESIDENT: The motion is now open for discussion, and I shall be pleased to hear any remarks or criticisms the proprietors may wish to make.

As no one seems to have anything to say, I will put the motion. It is carried unanimously.

THE DIVIDEND.

The PRESIDENT: I now beg to move:

> "That a dividend at the rate of 6 p.ct. per annum be now declared, and that warrants be transmitted to the registered addresses of the proprietors by post, for the amount of such dividend, less the interim dividend paid in respect of the first half of the year."

Mr. A. M. PADDON: I have pleasure in seconding that resolution.

The motion was agreed to.

RE-ELECTIONS.

The PRESIDENT: I will now move:

> "That Mr. Arthur Matthews Paddon be re-elected a Director of this Company.'

Mr. B. R. GREEN seconded, and it was agreed to.

The PRESIDENT: Next I propose:

> "That Mr. Frederick McLeod be re-elected a Director of this Company."

Mr. H. FROST: I second that. I feel sure that all those who know Mr. McLeod's devotion to duty recognize that he will be of great assistance to the Board.

The resolution was carried.

Mr. PADDON: I thank you very much for re-electing me to the office of a Director. To serve as a Director of this Company is of peculiar interest to one who, like myself, has had a life-long connection with gas-works.

Mr. MCLEOD: I thank you all very much for my re-election. I have served this Company practically throughout my life, and am keenly sensible of the honour you have done me in allowing me to continue in a different status my work on behalf of you all. It will be a proud privilege to me to continue—in perhaps a less active way, but with undiminished interest—to render all the assistance I can to the President and my colleagues on the Board. For more than a quarter-of-a-century I have had the special privilege of working under the direct personal leadership of our President—for most of the time as Secretary or General Manager; and throughout this period I have been honoured with his confidence and that of the Directors generally. Whenever there have been special difficulties—and there have been many during the past year—I have always been conscious of the President's friendship, counsel, and sympathetic support, without which the burden of office would frequently have become almost unbearable. Then, again, I have been very fortunate indeed in being surrounded by colleagues whose loyalty, devotion, and readiness to co-operate with me could not have been surpassed. They have always been most ready and willing to help in any manner which promoted the welfare of the Company or of the employees; and in their dealings with their subordinates they have always acted with a justice and fairness which rarely fails to win the respect and confidence of the intelligent worker. From my own personal knowledge, I can say that there is throughout the whole of our service, in every rank, a feeling of trustfulness, confidence, and goodwill among the workers generally that augurs well for the continued progress and expansion of the Company's interests. This is not due to any series of accidental causes, but is an out-growth directly of that system of co-partnership to which the President has alluded, and which for more than a generation has withstood the test of prosperous years and of adversity, and has emerged stronger for the latter. I much appreciate the honour now accorded me, and hope in some small way to be of use in helping to maintain and extend the general welfare of the Company, which is a union of three interests—namely, the public, the shareholders, and the employees.

The next resolution was:

"That Mr. John H. Fry be elected an Auditor of this Company in the place of Mr. G. S. Fry, resigned."

This was carried; and Mr. FRY acknowledged his appointment, the duties of which, he said, would not be altogether new to him, as he had had many years' association with the accounts of the Metropolitan Gas Companies.

EXTRAORDINARY GENERAL MEETING.

AGREEMENT WITH THE SOUTH SUBURBAN GAS COMPANY.

The PRESIDENT: We have now come to the end of our business pertaining to the ordinary meeting; and I will ask the Secretary to read the notice convening the extraordinary meeting.

The SECRETARY proceeded to do this.

The PRESIDENT: As the notice states, the business before this meeting is the confirmation of an agreement provisionally entered into between ourselves and our neighbours the South Suburban Gas Company. Most of you will remember that two years ago we brought before you a proposal to support an application to Parliament of an Act enabling us to enter into certain arrangements with other undertakings. I explained very fully at the time what those proposals were, and you were good enough to accord them your full support. I have now the pleasure to bring before you their first fruit. The agreement between us is based upon the fact that our own undertaking, having its gas and chemical works on the Thames, is in the more favourable position to manufacture gas cheaply. On the other hand, the South Suburban Gas Company is in closer touch with the requirements of its consumers than an organization outside it could be. If we take up the increase of their load by a supply in bulk, they will be free to confine future capital expenditure to mains and fittings. They will get the gas required for their new business at a lower price than that at which they can produce it; while our own costs will be reduced owing to lower overhead charges and more favourable working conditions. The agreement provides for our becoming financially interested in their undertaking by the holding of half-a million of their ordinary stock, for which we will exchange a 6 p.ct. preference stock. Their ordinary stock pays now 6½ p.ct., and the difference will come into our account. If the agreement meets with your approval to-day, and is subsequently approved by the South Suburban proprietors, we shall apply to the Board of Trade for their official sanction under the terms of the enabling Act.

The PRESIDENT then went fully into the terms of the agreement, and concluded by moving:

> "That the agreement dated Jan. 28, 1927, and made between the South Metropolitan Gas Company of the one part and the South Suburban Gas Company of the other part be, and the same is hereby, approved, subject to such alterations, variations, and additions as the Board of Trade may think fit to make therein, and as the Directors of the South Metropolitan Gas Company may approve."

The VICE-PRESIDENT: I have pleasure in seconding that, because I am perfectly sure that this suggested working arrangement between the two Companies is a very wise and proper thing for both.

The Rev. GEORGE MARTIN: Will the South Suburban Company adopt your system of co-partnership?

The PRESIDENT: The South Suburban Company were one of the first—I do not know whether they were actually the first—to follow the lead of this Company when Sir George Livesey inaugurated the system many years ago. So they are already working under co-partnership conditions. One of the advantages of the arrangement defined in the agreement is that in all respects the two Companies will go on as they are. The individuality of each will be preserved; but there will be an association between the two which will enable each to help the other. That is the alternative to merging the two into one undertaking. I believe there is an optimum size for undertakings. If you look round and envisage recent events, I think you cannot fail to be struck by the fact that very large undertakings have their disadvantages. There was during the war a great tendency towards amalgamation; and I think we are suffering to-day from too much of that policy. A proposal of this kind gives us all the advantages of amalgamation without its disadvantages. [Applause.]

The resolution was then carried unanimously.

VOTES OF THANKS.

The PRESIDENT: I have one more pleasant duty to perform, and that is to propose:

> "That the best thanks of this meeting be accorded to the employees of the Company of all ranks for their attention to the interests of the Company."

Personally, I find it difficult to express my great indebtedness to our employees. Cases sometimes arise of a man having been in our employ for a long time, and then one fine day a special occasion may unexpectedly reveal some particular knowledge possessed by him which he has been storing up from the days of his apprenticeship, and which proves of much value to the Company. I have frequently had proof of what an enormous asset it is to be able to draw upon these stores of knowledge. In the past I have often told you of the excellence of our staff. I cannot speak too highly of either the technical or the commercial branches. We are greatly indebted to all our officers for the admirable manner in which all have seconded our efforts to carry out the policy of which, year after year, you have expressed approval at these meetings.

Mr. E. HONORATUS LLOYD, K.C.: I have great pleasure in seconding that.

The resolution was cordially passed.

Mr. W. A. HOUNSOM: I should like to propose a hearty vote of thanks to the President and Directors. I feel that this year at meetings in connection with gas companies there should be, at any rate, a little sympathy expressed by the general body of shareholders with those who have borne the heat and burden of the day during 1926. It is only those who are a little in the know who can appreciate the strain and the anxiety which the Directors have had to bear. For many years I have been associated with gas companies; and I am proud of the gas industry in connection with what has been done for the benefit of the community during periods of national crisis. The Board of the South Metropolitan Company have taken their share of the burden, and, with the assistance of all ranks of the employees, to whom the President has alluded, have come triumphantly through this great year of crisis.

The Rev. GEORGE MARTIN seconded the vote, which was carried by acclamation.

The PRESIDENT: If I could appreciate this vote more from any one circumstance than another, it would be by reason of the fact that it has been proposed by a very old friend of the Company, Mr. Hounsom. I remember the time when he was a very regular attendant at our meetings, and was a great supporter of the far-reaching and novel proposals which Livesey put forward in the early history of this Company. Everything was not so plain sailing then as now. To-day you all realize the importance of Livesey's work; but in his time, everybody was not of his opinion. We are much indebted to Mr. Hounsom for coming here to-day; and on behalf of myself and the other members of the Board, I thank him for the sympathetic manner in which he has referred to our labours. I do not want to be unduly optimistic, but I have a great belief that the sun of gas is to rise higher than we imagined in the past it ever would rise. I believe many helpful rays and much advantage will result from the agreement which I am so pleased to think has met with such a cordial reception at your hands to-day. With regard to the vote of thanks to the staff and employees, I will see that this is duly communicated to the various works and centres.

TANKLESS HOLDER AT IPSWICH.

Mr. Henry Woodall's Remarks at the Company's Annual Meeting.

Moving the adoption of the report and accounts at the annual meeting of the Ipswich Gas Company, referred to to-day in our "Results of Gas Companies for 1926," Mr. HENRY WOODALL, the Chairman, said that for some time the Company had been short of storage capacity. They had now started the erection of a tankless gasholder to contain 2 million c.ft. This would practically double their storage, and would certainly effect economy in working. The shareholders might like to know why they had adopted a tankless holder—the first of its kind erected in England. He shared with the Engineer, Mr. Frank Prentice, the responsibility—if it was a responsibility—of adopting this type. To begin with, the cost of the holder and foundations was some thousands of pounds less than that of a holder in a tank. The tankless holder was by no means new; and there were over a hundred holders built on this system in Europe and America, and some of them were the largest in the world. In America there was one which held 15 million c.ft., and one was being built to hold 20 millions.

The Ipswich Gas Company had always been up to date, and in Mr. Prentice they had an Engineer worthy of his predecessors. Whether he or Mr. Prentice first mentioned tankless gasholders for use in Ipswich he could not be sure, but their position was such that a holder of this type was eminently suitable, because such holders gave constant pressure—not fluctuating, as did those of the ordinary type. This would save them the considerable cost of pumping now necessary. Mr. Prentice was courageous, but also cautious; and before deciding on this type of holder he made many inquiries. Before adopting it they visited the Continent, and saw various types themselves. Everywhere they were told that they had acted perfectly, and on no account would the users revert to the older type. He, the Chairman, told the manufacturers that he was prepared to erect a holder, but that they must employ a British firm to do the work; and the Directors had accepted the tender of an English firm and not a German one. It was true that most of the material came from Germany, but what they could get here they had obtained; some of the accessories being made in Ipswich.

Now, no one had more reason than he to appreciate the excellent work their gasholder makers did; but they for some reason had not adopted the new type of holder, though he had no doubt they would do so. Before long, he felt sure, their manufacturers would be making the tankless holder, and doing it better than anyone else.

Some of the shareholders might read the "GAS JOURNAL," and might be a little alarmed at an article appearing in it. (See "JOURNAL" for Feb. 16, p. 368.) The "GAS JOURNAL" was a highly-respected technical journal, and the gas industry owed much to it; but he ventured to think that the article in question went a little far in suggesting there was a possible "menace" in this form of holder, since it had been adopted by many leading gas engineers throughout the world. He trusted, however, no one would boycott their old friend, as the article suggested, even if it had been a little less judicial than usual. He was sure they would agree with him that they must take advantage of every opportunity that would enable them to sell gas cheaply.

[The foregoing is referred to in our editorial columns to-day.—ED., "G.J."]

Gas Lecture at Darlington.—A lecture on "The History, Manufacture, and Use of Coal Gas" was delivered by Mr. R. B. Hodgson, M.I.Mech.E., Managing Director of the Whessoe Foundry and Engineering Company, before the members of the Engineers, Foremen, and Chief Draughtsmen's Association at Darlington, on Monday, Feb. 21. The lecturer sketched the early history and struggles of the gas industry, generally described the process of manufacture, and then related some of the various uses to which gas and its bye-products are put.

SOUTH SUBURBAN GAS COMPANY.

ANNUAL ORDINARY MEETING.

The Annual Ordinary Meeting of the Company was held on Friday last, at the Cannon Street Hotel, E.C.—Sir J. FORTESCUE FLANNERY, Bart., M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Wilfrid Wastell, F.C.I.S.) read the notice convening the meeting; and after the confirmation of the minutes of the last meeting, the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN: Ladies and gentlemen,—I declare this meeting now to be duly constituted, and it is my duty next to move the adoption of the report and accounts.

EMINENTLY SATISFACTORY RESULTS.

Before doing so, however, I think I shall be able to show you that, in spite of the effect upon industry of the disastrous coal strike, which lasted from the beginning of May until December, the results of our year's trading are eminently satisfactory. The total quantity of gas sold during the year shows an increase of 663,420 therms, or 3·9 p.ct.—nearly 4 p.ct. increase—upon the year 1925. There is very little doubt that, but for the need for economy forced upon consumers by the conditions arising out of the coal stoppage, this increase in output would have been still larger, although it is not possible to estimate to what extent. The restriction placed by local authorities upon street lighting, however, led to a reduction in the quantity of gas supplied by the Company for that purpose during the year of nearly 10 p.ct.; and there is no doubt whatever that a similar voluntary economy was exercised by consumers. The number of consumers has increased during the year by the record figure of 4850, while the number of gas cookers, fires, &c., hired and sold to consumers shows an increase of 12,308, also a record. For the year 1925 the corresponding figures were 3597 and 10,481 respectively—a comparison which not only indicates a steady expansion of the Company's business, but demonstrates that the popularity of gas as a cooking and heating agent is becoming more firmly established year by year.

PRICE OF GAS.

Against the justifiable satisfaction derived from these figures, however, must be recorded the disappointment which your Directors felt at the necessity for increasing the price of gas in November last. The financial results of the first few months' trading were so satisfactory that, notwithstanding the existence of the coal strike, it was decided towards the end of May to reduce the price of gas in the Company's area by three-fifths of a penny per therm from and after the end of the Midsummer quarter. When that decision was reached, it was not anticipated that the strike would last into the winter months. You will remember that everybody said the strike would be of short duration. But as the weeks went by it became compulsory to purchase heavy tonnages of foreign coal at prices far in excess of those we were paying for English coal before the strike suspended our contracts. I think I am right in saying that we were one of the last, if not the last, of the gas companies to increase the price of gas to an extent that would recoup to the Company this heavy increased cost; and it was not until the middle of November that we were most reluctantly compelled to increase the price of gas by one penny and two-fifths per therm. We are glad to be able to say, however, that, with the accounts for the past year before us, we can see our way to an early reversion to normal prices; and notice has already been given to our consumers that our price of gas will be reduced by four-fifths of a penny per therm from the end of the present quarter. Unless unforeseen circumstances arise, we hope to be able to announce a further reduction from the end of the June quarter. It has been exceedingly gratifying to your Directors that, throughout the whole difficult period of the strike, we were able to meet the heavy demand for gas without reducing either pressure or quality. ["Hear, hear."] I claim that with absolute confidence, although I believe that there have been a few consumers and one or two of our friends of the Press who have not recognized the fact as thoroughly perhaps as they might have done.

REVISION OF THE STANDARD PRICE.

At our last annual meeting I explained fully the reasons which impelled us to make an application to the Board of Trade under section 10 of the Gas Regulation Act, 1920, for a revision of the Company's standard price. Our case was heard early in March at a public inquiry most patiently and thoroughly presided over by Mr. J. F. Ronca, the Director of Gas Administration to the Board of Trade; and the arguments for and against our case were fully debated. The result of the inquiry was the granting by the Board of Trade of an Order providing that the standard price should be 10·8d. with the right to the Company to increase the dividend payable in any half-year to an extent not exceeding 11s. 8d. p.ct., such addition to the dividend being irrespective of the price charged by the Company for gas supplied. This means that our standard price is really divided into two parts—the 10·8d. per therm which is subject to revision at any time by the Board of Trade on application either by the Company or any local authority (and all the local authorities were represented at the Board of Trade inquiry) within the Company's area of supply, and the additional dividend of 11s. 8d. per half-year, or £1 3s. 4d. p.ct. per annum, which is not assailable for a period of five years from the date of the Order. Your Directors are satisfied that this new price is a fair and equitable one, doing justice to the consumers, to the Company, and to the co-partners.

When it became apparent that the heavy additional cost of coal would compel gas companies to increase their selling price of gas to such an extent that dividends would be adversely affected, the Board of Trade issued the Gas (Amending Orders) Rules, 1926, giving the right to gas companies of applying to the Board of Trade for an amended standard price to operate over a definite period. As soon as we were in a position to estimate within a reasonable degree of accuracy the extent to which our finances would be affected by the strike, we lodged an application with the Board of Trade for an Amending Order, which was granted to us in October; and under this, within certain limits, our dividend is secured against reduction until the end of June next, by which time, as I have already said, we hope to be able to restore the price of gas to at least its pre-strike level.

NEED FOR FRESH CAPITAL.

I now come to the question of new capital. When I last addressed you, a year ago, I dwelt upon the desirability of reducing the loan at our bank by the issue of fresh capital; and after a careful survey of the situation, we decided, with every prospect of success, in March last to offer by tender £400,000 of 5 p.ct. ordinary stock. The statutory one month's notice of our intention to do so was given; but then—after the notice had been published, and we were committed to the course that the notice set forth—happened the most disastrous and unjustifiable industrial misfortune that has overtaken this country for a generation, and unfortunately our endeavours were frustrated by the general strike in May. This calamity began upon the very day on which the offer was advertised in the Press throughout the country; and it terminated on the day following the last date for the acceptance of tenders. Under the paralyzing effect of the strike, we received tenders for only a comparatively small part of the stock offered. Evidences were not wanting that, but for the general strike, the response to our invitation would have been as successful as our last invitation of a similar character; and when the time is opportune, we shall launch a fresh issue with every confidence in its complete success. Apart altogether from the desirability of reducing the indebtedness to our bankers, the need for fresh capital to keep pace with the extension of our business continues to be imperative.

FIGURES FROM THE REVENUE ACCOUNT.

With regard to the statement of accounts for the past year, the interesting and gratifying points are centred in the revenue account. The outstanding item on the debit side of that account, and the one which calls most for comment, is that showing the expenditure upon the coal, oil, and coke used in the manufacture of gas. The total cost under this head of £498,137 is £94,904 more than for the previous year. This increased expenditure is, in the main, due to the enforced use of coal imported from abroad, the extra cost to the Company of the quantity purchased totalling no less than £150,000 over and above the price we should have paid for our coal if our contracts for English coal had not been forcibly suspended during the period of the coal strike. In other words, we were sending all that money abroad to give profit to the foreign coal owners and employment to the foreign coal miners. Part only of this additional expenditure is included in the accounts under review; and the current half-year will bear the remainder of the extra charge, because an appreciable proportion of the foreign coal was delivered during the month of January. All the other items on the debit side of the revenue account show, in comparison with the previous year's figures, small variations which are fully accounted for by the progress of the Company's business. Turning to the credit side of the account, the income from gas shows an increase of nearly £50,000, compared with the previous year, which is due partly to the larger quantity of gas sold during the year, and partly to the increased price unavoidably charged, which operated from the middle of November. The sale of coke and breeze has yielded an increased income of nearly £39,000; and it is gratifying to know that this result was achieved without any undue inflation of prices, even during that period of the strike when the demand for coke was far in excess of the quantity available. A somewhat unexpected increase in our revenue was yielded by the sale of tar, to the extent of £13,000, so that these two residuals alone yielded an additional income equal to about one-half of the extra cost of coal debited against last year's accounts.

THE BALANCE-SHEET.

Now, ladies and gentlemen, if you will turn to your balance-sheet, you will find items which, contrasted with the position shown a year ago, are worthy of your very special attention. I will ask you just to look at two or three of them. The balance of the reserve fund now stands at £72,912; a year ago it was £70,434. The special purposes fund stands at £22,032, compared with £21,170 a year ago. The co-partners' superannuation fund, in the general balance-sheet, stands at the very important amount of £166,062, as compared with £147,373 a year ago. The officers' guarantee and contingency fund is £2795, as compared with £2608. The co-partnership bonus and savings are £25,348, as compared with £21,125 a year ago. The temporary loan—bankers' loan—is £375,000, as compared with £400,000 a year ago. I would call your attention to the fact that every one of those items is more favourable to the Company than a year ago, notwithstanding the stress and difficulty of this terrible strike. [Applause.] We have increased all our reserves, and we have reduced our indebtedness for loans. Now if you will refer to the other side of the account, you will find that the reserve fund invested is the same as it was a year ago. The special purposes fund invested is also the same as a year ago; and the amount due for private rental and public rental is £151,308, as compared with £141,000 a year ago. Our customers owe us a little more. The amount due for coke and other residuals is £6000 more than it was a year ago; and sundry accounts are £14,000 more, so that on that side of the balance-sheet you will see we are also in a satisfactory position. It is a matter for congratulation, and I think an evidence of accurate foresight and calculation by the Board and its experienced and trusted officials, that, although for one quarter, the price of gas was reduced, and the inevitable increase in the price

to meet the extra cost of coal did not operate until within six weeks of the end of the year, we have been able to produce a trading account which not only justifies our recommendation as to dividend, but also enables us to carry forward at the end of the year a slightly larger surplus than that with which we commenced the year.

BLESSINGS OF CO-PARTNERSHIP.

These results, ladies and gentlemen—I hope I am not unreasonably phrasing them—have been realized in circumstances of the most unprecedented difficulty. They have been obtained mainly by the help of the officials of this Company, who are second to none, with their staffs, and by the assistance of the co-partnership system which is shared in by all our workers. I cannot say enough about the co-partnership system, whenever I get on my legs. I know I bore my friends, but I hope I shall not bore you by showing you how our confidence in co-partnership grows year by year. As I went over our place, and saw the contented, industrious goodwill of all our partners at our various works, and thought of the starving miners and their families, who ought to have been getting coal for our use, I felt the contrast between their system and our system of co-partnership, which, somehow or other, has never yet been properly extended to other trades; and I felt more and more—as I am sure you will—the blessings that co-partnership has brought to us. Our Works Committee, with the elected representatives of the men, our officials, and our Directors, all meet together from time to time in conference on terms of equality and goodwill. Our Employee Directors are with us at every Board meeting, and never fail to contribute something—and sometimes a very great deal—to the benefit of our discussions; all of us working together hand in hand for the benefit of all concerned, including the consumers, the workers, and the proprietors. That is a fine and cheering contrast to some of the things which we find outside. May the co-partnership system go on and prosper, and may it ever be as useful and beneficial to the gas trade and to this Company as it has been in the very difficult and strenuous times through which we have just passed. ["Hear, hear."] I now beg to move:

> "That the report of the Directors, and the accounts examined and signed by the Auditors, be received, adopted, and the report entered upon the minutes."

The DEPUTY-CHAIRMAN (Mr. B. R. Green) seconded the motion.

Mr. PARDY inquired whether co-partnership in the Company's works was compulsory or optional. Judging by this Company, and other companies whose meetings he had attended, it led to excellent results.

Mr. SCOTT asked if the Board or their technical officers thought that the success of low-temperature carbonization—assuming that it ever was a success—would have any very serious effect upon the consumption of gas, which, as they all knew, of recent times had been increasing from year to year. He asked this question because in a lecture given the other day, the Professor of Mining at Birmingham University had rather startled him by saying that he thought low-temperature carbonization, if it were ever a success, would be too late in the field. That was to say, that by the time low-temperature carbonization fuel was available for the home, the housewife would have found gas for heating and cooking so beneficial that she would not give it up.

The CHAIRMAN replied that co-partnership in the Company was optional; but, in the circumstances of co-partnership in the gas trade, the option was practically always exercised. As a matter of fact, during the past year they had had applications from younger people than were previously admitted to co-partnership, asking that the standard of age might be lowered, so as to allow of their admission. Thus it would be seen that co-partnership was going deeper and deeper—being extended to even younger people than was the case previously. As to the very general question about low-temperature carbonization, he would like to say that he had known of this system—first in the form of "Coalite"—for a great many years. It was going through various phases of development. What might be the ultimate outcome, and how far it might be assisted by legislation, he did not know; but he felt certain that, whether produced by low-temperature or higher-temperature carbonization, the use of gas had become so general, and so accepted by the people, that it would hold its place in the service of the community as long as Mr. Scott, or himself, or anyone else present had any reason to look forward.

The resolution was then put to the meeting, and unanimously carried.

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. W. G. WALLER, it was agreed:

> "That a dividend for the half-year ended Dec. 31 last be now declared at the following rate per annum—viz.: 6½ p.ct. on the ordinary stock, less income-tax; and that warrants for the net amounts be forwarded on the 10th prox. to the registered addresses of the proprietors."

RE-ELECTIONS.

Dr. CHARLES CARPENTER, C.B.E., proposed the re-election as Directors of Mr. Benjamin R. Green and Mr. Harold Gundry.

Mr. R. GARRAWAY RICE said he would like to second this, and to take the opportunity of congratulating Mr. Green—who had been well known to him for very many years—upon now being Deputy-Chairman of this important Company. He was extremely pleased to see the way in which the business of the Company had been carried on.

Mr. B. R. GREEN and Mr. HAROLD GUNDRY returned thanks.

The retiring Auditor (Mr. Ernest D. Davey) was re-appointed, on the proposition of Mr. C. P. CROOKENDEN, seconded by Mr. F. W. CHURCH, F.C.I.S.

This concluded the business of the ordinary meeting.

EXTRAORDINARY GENERAL MEETING.

The Agreement with the South Metropolitan Gas Company.

An Extraordinary General Meeting was then held: (1) To consider, and if thought fit to approve, an agreement between the Company and the South Metropolitan Gas Company which has been entered into under, and by virtue of, powers conferred upon both Companies by the South Metropolitan Gas Act, 1925. The agreement is under the above Act subject to the approval of the Board of Trade; and the main object of such agreement is: (1) To provide for a supply of gas in bulk to the Company by the South Metropolitan Company for a period of 25 years or more. (2) To authorize the issue of ordinary or preference stock. (3) To empower the Directors to borrow further money.

The SECRETARY having read the notice convening the meeting,

The CHAIRMAN said: Ladies and Gentlemen,—This extraordinary general meeting is called to consider, and, if approved, to sanction, an agreement provisionally made between this Company and the South Metropolitan Gas Company; and I must detain you for a few moments while I make some observations on the matter. The development of the general supply of light, power, and heat, both to industrial factories and for domestic purposes, as you all know has been enormous of late years. The source in this country of light, power, and heat is coal; and it will be so for very many years, although, in Ireland, they are trying, by harnessing the Shannon, to find in the movement of water power resources that can be used to replace coal. But in this country coal is the sole, or almost the sole, source of energy, along with, of course, oil. Now the extraction of energy and its conveyance to the places where it is required by users have been, and are being, effected by two main means—gas and electricity.

THE ELECTRICITY ACT.

Electricity, as you will remember, has lately been the subject of very important legislation applying to the whole country. Gas has not been the subject of such sweeping legislative changes; and I, for one, hope it never will be. The Electricity Bill which was passed last session was based upon one general policy, and that policy was this. Some districts have powers and machinery for generating electricity which are larger than the demand requires; other districts have a larger demand—an increasing demand—than the machinery belonging to their power stations can supply. Therefore there has been devised a scheme of connecting one district with another, so enabling the generating plant which is not fully occupied in one district to come to the aid of the generating plant which is overworked in another district—thus avoiding wasteful expenditure on increasing plant which is not required; if succour can be obtained from a neighbouring source of supply, and so producing economy all round. That is the broad outline of the reasoning that was the foundation of the Electricity Bill; and, as I have said, there is no such legislation of a general character for the gas trade—no compulsory legislation. But there has been enabling legislation by Private Bill relating to that part of the Metropolis which is south of the Thames similar in character to that which I have described as the general basis of the Electricity Bill.

UNDEVELOPED TERRITORY OF THE COMPANY.

The facts are, as regards ourselves, that the South Suburban Gas Company have a very large and, as yet, undeveloped territory—that is to say, undeveloped in regard to new houses and in regard to gas supply—in the counties of Surrey and Kent. Year by year, there has been an increase in the demand for gas supplied by this Company—more cookers, more stoves, more burners, and more customers. No year has shown other than an increased demand as compared with the preceding year; and the truth is that we have now reached the maximum of economical production with our present gas plants at Sydenham, at Bromley, and at Dartford. The immediate outlay of a very large capital sum will be necessary on the part of this Company unless the system of interchange compulsorily put upon the electrical trade is voluntarily accepted by many in the gas trade, including ourselves. I have described our position in regard to the rural and country territory not yet fully occupied from the gas point of view. On the other hand, the South Metropolitan Gas Company have an urban district which is very largely built over; and, although they have an increasing demand for gas from their customers, yet there is still some power for making gas, which is not fully occupied, belonging to the South Metropolitan Gas Company.

ADVANTAGES TO BOTH COMPANIES.

Now, the districts of the two Companies are at many points, and for many miles of country, co-terminous. One can go over from one side of a street to the other, and pass from the South Suburban district to the South Metropolitan district. Therefore, if some part of the unoccupied plant of the South Metropolitan Company can be utilized for the supply of gas to the consumers of the South Suburban area, the capital outlay of the South Suburban Company will be reduced for some years to come. Again, the South Metropolitan Company have riverside works and a large fleet of colliers, while the South Suburban Company have to receive their coal over the railway from the place of discharge of the ships, excepting as regards a comparatively small quantity of coal which the South Suburban Company use at their Dartford Works. The economy of completely sea-borne coal is very considerable. If, therefore, an arrangement could be made between the two Companies by which, on the one hand, some of the partly unoccupied plant of the South Metropolitan Company, which is in existence, can be utilized, instead of the South Suburban Company having to raise and expend more capital immediately, and also to give to the South Suburban Company, at all events, a part of the economy of sea-borne coal, it would apparently be an arrangement of mutual advantage. This matter was discussed in a general way, and then, in order to arrive at some conclusion, both Companies appointed delegations of Directors, who met to thrash out the question from the point of view of their respective Companies. There was much discussion, many points of bargaining, and a good many adjourned meetings and re-adjourned meetings; but at last the provisional agreement has been arrived at which is to-day being submitted for your approval. If you approve of it, it will still have to go before the Board of Trade for examination, and for their decision as to whether it is fair all round.

TERMS OF THE AGREEMENT.

I have no wish to weary you; but I think it is my duty to summarize the conditions which are set forth in the agreement. The preamble recites the legislative powers which enable such an agreement to be made. As I have already indicated, that has been done by a Private Bill. Clause 1 provides that the South Metropolitan Company shall supply, and the South Suburban Company shall take, additional supplies of gas. Clause 2 states that each Company is to provide and lay mains and apparatus in its own district. Clause 3 provides that the agreement is to last for 25 years, with two years' notice afterwards of termination. Clause 4 provides that the gas is to be delivered at the Sydenham Works at prices 35 p.ct. below the prices charged by the South Metropolitan Company to other purchasers of gas. This discount must last for at least five years, after which it may be the subject of revision; and, if there is not an agreement as to any change, then it will go to arbitration. Clause 5 provides for the purity and good quality of the gas to be supplied. Clause 6 states that the South Meropolitan Company shall provide the meters and the apparatus necessary for measuring the gas. Clause 7 provides for testing the meters. Clause 8 provides for penalties on the South Metropolitan Company if they fail to supply the gas they contract to supply. Clause 9 stipulates for a daily statement of the gas supplied; and clause 10 for weekly, fortnightly, and yearly statements and payments between the two Companies, and for arbitration in the case of any differences upon those accounts.

EXCHANGE OF STOCK.

Under the terms of clause 11, the South Suburban Company shall use their best endeavours to obtain the exchange by proprietors of £500,000 of ordinary stock of the South Suburban Company for £500,000 of 6 p.ct. preference stock of the South Metropolitan Company. This has to be done after the approval of the agreement by the Board of Trade; and there is a time limit. That clause also provides that the South Suburban Company shall include the South Metropolitan Company among its investors in the case of any future issue of stock. Clause 12 is for the Companies to appoint Directors to each other's Boards, so as to ensure community of working, as the interchange of stock will ensure community of profit and loss. Clause 13 provides that the South Metropolitan Company shall unload coal at their riverside wharves for the use of the South Suburban Company, and make analyses of coal samples for the benefit of the South Suburban Company. Clause 14 is a very important one, and provides that no officer or workman of the South Suburban Company shall suffer loss in advancement, status, or emolument by reason of this agreement; this being in the interest of all the co-partners. It also stipulates that if any Director retires in consequence of this arrangement, he will be compensated upon the recognized seven years' scale. The next clause makes the agreement subject to the approval of the proprietors of both Companies and to the interchange of stock already referred to. That is to say, if a sufficient number of proprietors do not come forward asking for their stock to be exchanged, then the agreement will not have effect. According to clause 16, subject to the approval of the Board of Trade, each Company shall endeavour to obtain such exchange and approval by the stockholders at their general meeting. Clause 17 provides for arbitration under the nomination of the President of the Institution of Civil Engineers. Clause 18 provides against voluntary assignment of the agreement; clause 19, for formal notices; and clause 20, that each Company should pay its own costs. It is a very comprehensive agreement, laboriously discussed between the Directors; and it was believed likely to work to the advantage of all concerned.

FINANCIAL MATTERS.

The resolutions include two other provisions—one to enable the Directors to issue further ordinary or preference stock, in accordance with our Act of 1920, and the other to enable the Directors to borrow money on mortgage or debentures under the provisions of our Act of 1920, or under the South Suburban Gas Order of 1926. Our Solicitor, Dr. Blyth, is with us to-day; and if there are any other details you require, I am sure he will be only too glad to answer any questions. For myself, I can say that I believe this agreement will have the advantage for the gas industry which I have endeavoured to explain in regard to the electrical industry. I believe it will work to the benefit of all concerned. Therefore I have great pleasure in moving:

"(1) That the agreement dated Jan. 28, 1927, and made between the South Metropolitan Gas Company of the one part and the South Suburban Gas Company of the other part, be, and the same is hereby, approved, subject to such alterations, variations, and additions as the Board of Trade may think fit to make therein and as the Directors of the Company may approve.

"(2) That the Directors be, and they are hereby, authorized from time to time to raise any capital which the Company is authorized to raise under the provisions of the South Suburban Gas Act, 1920, by the creation and issue of ordinary stock or of preference stock or wholly or partly by one or other of these modes respectively, and to provide that any stock issued as preference stock may be either of one class or of several classes with different privileges, and may bear such rate of dividend as the Directors may determine at the date or respective dates of the issue thereof.

"(3) That the Directors be, and they are hereby, authorized to borrow at such times, in such amounts, on such terms, and subject to such conditions, and at such rate or rates of interest, as they may from time to time determine, all moneys which the Company may from time to time be authorized to borrow under the provisions of the South Suburban Gas Act, 1920, or of the South Suburban Gas Order, 1926, and that such moneys may be raised either on mortgage or by the creation and issue of debenture stock."

The DEPUTY-CHAIRMAN said he seconded the resolutions with every confidence that the arrangement would be greatly to the advantage of both undertakings.

POINTS RAISED AND REPLIED TO.

Mr. CLEVELAND asked if he could take it that there would be a quotation applying to their 6 p.ct. stock. This was a rather important point.

Mr. R. GARRAWAY RICE regarded this as a very happy alternative to the scheme put forward some years ago, when the Company bought land for building new works. The present was not a time to do anything of that kind; and the Directors had hit upon a plan which would tide them over until the times were more propitious for the erection of new works. The scheme had his hearty support.

Mr. A. E. BROADBERRY said he had listened with considerable interest to the speech of the Chairman; and he hoped to be excused if he differed from him on several points. The Chairman had not dealt at any great length with the advantages that were going to accrue to the South Suburban Company under this scheme of linking-up. He ventured to suggest that no such analogy existed as the Chairman had drawn. He (the speaker) could see a great many advantages in the scheme; but they were all advantages for the South Metropolitan Company, and not for the South Suburban Company. The South Metropolitan Company had the distinction of being the only Company in the London area which had a decrease last year; whereas the Chairman had told them of the progressive business of the South Suburban Company, and of its very bright prospects. They all recalled the great benefits which the Erith scheme was going to bring—cheapness of coal transport, greater facilities for the removal of residuals, new works with modern plant, bringing greater profits. And all this was to go—for what? It was not even an amalgamation that was being proposed. The South Suburban works were not to be extended; and if they were not going to extend, they would stagnate. So far as handling coal at the wharf was concerned, this would bring an increased profit to the South Metropolitan Company; but the South Suburban Company would still have the transport expenses of taking coal from the South Metropolitan wharf to Sydenham, Bromley, or Dartford. The agreement was to last 25 years; and during this time the South Metropolitan Company were going to acquire a financial control of the South Suburban Company which would continue. And the exchange was to be South Suburban shares of a known and definite value for stock which was not in existence at the present time, and therefore was of unknown value. If the opposition failed now, he hoped the Board of Trade would say that the scheme was of no advantage to the proprietors of the South Suburban Company, and to their consumers.

Mr. CLIFFORD HUNT inquired whether this irredeemable preference stock would carry voting rights.

Dr. BLYTH said he presumed the stock would not entitle the holders to have votes at the South Metropolitan meetings.

Mr. HUNT: Should I be in order in suggesting that the South Metropolitan Company should give us voting rights?

Dr. BLYTH: There is nothing in the agreement dealing with voting rights. It might be varied; but that is a matter, first of all, of bargain between the two Companies.

Mr. SCOTT: Will you explain why there is to be this exchange of shares?

The CHAIRMAN: For community of interest. Continuing, he said it would be seen that this working together was very nearly an amalgamation, and that there must be community of interest, so that everything might work for the best of all concerned. Quotations would be applied for to the fullest possible extent. He might point out that since this agreement was made known, the 5 p.ct. stock of their Company had been quoted up to 103½, as compared with a quotation previously of nearly 5 points below this figure. The intention when the land at Erith was purchased—and a wise intention, as they all thought at the time—was to erect new gas-works upon it. Then came the war; and the whole situation had been entirely altered. He felt sure Mr. Broadberry would agree that to erect works now would cost from two-and-a-half to three times as much as before the war; and this represented an expenditure on capital account which, in one sense, almost compelled a company who could get an arrangement with another company who already had the necessary plant, to enter into such an arrangement.

Mr. BROADBERRY: I agree; but I hope that state will not prevail for 25 years.

The CHAIRMAN replied that it did to-day; and the question was one of raising money, not in 25 years' time, but now, if they could not come to some arrangement as that now before the meeting. Mr. Broadberry had urged that all the advantages were to the South Metropolitan Company. Now, an agreement which gave all the advantages to one side was a foolish agreement. It was not so in this case. The principal advantages to the South Suburban Company were the saving of capital expenditure and the purchase of gas at so large a margin as 35 p.ct. between the wholesale and the retail price. Then there was the advantage of sea-borne coal. As to the exchange of stock, there were some who would prefer a 6 p.ct. investment which was secured by preferential position, to an ordinary share which had yielded the very satisfactory dividend of 6¾ p.ct. It was a choice which each stockholder could make for himself.

The resolutions were then put to the meeting; and on a show of hands, 29 voted for and 11 against.

The CHAIRMAN declared the resolutions carried by a majority.

VOTE OF THANKS.

Mr. JOHN RANDALL proposed a vote of thanks to the Chairman, Directors, staff, and employees generally, for the work done by them during the past year, in most exceptional circumstances.

Mr. SCOTT said he would second the vote, as representing a trust that had held shares in the Company for a generation or more. He was greatly impressed by the businesslike way in which everything connected with the Company was done, and the keen interest in affairs which was shown by the Chairman and the Directors. He supported the resolution for the agreement, on the theory that the Board knew all about it, and he knew nothing about it. [Laughter.]

The vote was carried by acclamation, and briefly acknowledged by the CHAIRMAN.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

ANNUAL GENERAL MEETING.

The Annual General Meeting of the Company was held on Tuesday, Feb. 22, at the Offices, No. 639, High Road, Tottenham—Mr. HENRY WOODALL, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. E. J. K. Fussell, F.C.I.S.) read the notice convening the meeting; and the Directors' report and the statement of accounts for the year ended Dec. 31 were taken as read.

THE COAL STOPPAGE.

The CHAIRMAN: Ladies and Gentlemen,—The year 1926 was a memorable one—memorable, alas, for the general strike and the prolonged coal stoppage. The most distressing thing about the coal stoppage is that, although we have spent millions on subsidy and doles, and further millions on foreign coal, thereby enriching others, and helping them to create a coal trade which will permanently damage our export trade—though not, I think, as much as some people imagine, because our English coal is far the best in Europe—there has also been the incalculable injury to our industries; and in the end no one is better off, and coal is as dear as, or dearer than, before the stoppage, and will remain so unless a different spirit is manifested, and the masters and men work together to lower the price of coal and reap the reward of a bigger output. On looking back, one wonders how the gas industry weathered the storm so successfully; and I personally feel more confidence than ever in its stability and power to meet what would appear to be almost overwhelming difficulties. We received practically no English coal for nearly eight months, and had to ransack the world for our supplies. The last cargo of foreign coal we obtained was from India, and some of that we are carbonizing to-day.

SMALL PRICE INCREASE.

In spite of the fact that some of this coal cost three times as much as our contract coal, our price was only increased by less than one halfpenny per therm, and that for only three months. You will want to know the reason for this record, which is one of the best, if not the best, of what are known as "London Companies." The chief reasons are that we had an unusually large stock of coal when the stoppage began, and that we utilized to the full our carburetted water gas plant. The staff and the men all did their best; and we have every reason to be proud of the result. Had the coal stoppage not occurred, we should have been able to reduce the price of gas; and in spite of it, we hope still to be below the pre-stoppage price before the end of the year. The men stood loyally by us, as we expected; but it must be remembered that the trade union did not call out our men, realizing the great importance to the community—especially to the poorer members of it—of a good gas supply. This emphasizes again the stability of our industry.

AN UNFORTUNATE ACCIDENT.

Before turning to the accounts, I must refer to an unfortunate accident that occurred at our Willoughby Lane Works. First, I am very glad to tell you that all the men who were injured are practically well again. The exact cause of the trouble is still a little obscure. There is no doubt, however, that we were using foreign coal with a high sulphur content, that the oxide of iron in the purifiers was very active, and that in consequence the purifiers became hot, and when the covers were lifted burst into flame. The damage done was very slight. We deeply regret, however, that we caused our consumers serious discomfort by sending out gas containing a large quantity of sulphur. This trouble was soon overcome, but not before consumers had been greatly inconvenienced. It is very unfortunate that this should have happened; and I do not want to treat the matter lightly. But it says something for the good service the Company has given the public for eighty years that a rumour was prevalent in the district, reported by one of the leading London daily papers as follows:

> "One rumour that found a good deal of credence was that the 'gas attack' was deliberately planned by the Ministry of Health, in co-operation with the Gas Company, in an effort to stamp out influenza. Sufferers were certainly unanimous that no germs in the world could have survived."

Although the actual cause of the enormous quantity of sulphur which was liberated by the purifiers is still under discussion by our chemists, I can assure you that we know how to avoid a similar occurrence. I should like to say that the men and staff worked splendidly to remedy the trouble, some of the latter working through the 24 hours. There is no blame attaching to anyone; and though we "did nothing we ought not to have done," we may have left undone some very minor things we might have done. I ask our consumers' forgiveness for the inconvenience they suffered.

THE ACCOUNTS.

Now to turn to the accounts. The capital account shows that we have expended £38,291 under the head of gas capital. The bulk of this has been spent on mains and meters—mains to meet new demands, and meters largely to replace old 3-light meters now too small for their purpose. Under the expenditure of new buildings is a sum for building the new bridge to our land on the east side of the railway. For some time this has been contemplated; and only recently we settled terms with the London and North-Eastern Railway Company, and the bridge is now well on the way to completion. Had it been ready for use, the serious accident that occurred at one of our level crossings on the 16th inst. would have been avoided. For more than a generation, no accident has occurred at this crossing; and it is sad to think one should happen on the eve of its abolition. On the electricity side we have spent £12,220, largely, again, on extension of mains. Deducting depreciation, our total capital expenditure has been £24,337. We have, however, had an increase of business; and the capital per million cubic feet sold (the point that matters) is practically the same as last year—just under £500. Turning to the revenue account, the outstanding figure there is the fact that coal and oil have cost us almost exactly £100,000 more than last year; and this year there is no transference to renewals, whereas last year we were able to place £10,000 to that account.

THE DIVIDEND.

The final result is that, if the dividend we propose is approved by you, we shall be able to pay it without calling upon our reserves, and only reducing the carry-forward from £39,500 to £37,500, or by £2000. We have had to forego any contribution to renewals. Last year we put £10,000 to this account; and, in addition, were able to increase the carry-forward. But I do feel very satisfied, and I trust you do also, when we see, after the anxious time we have been through, that the financial position of the Company to-day is rather better than at the end of 1925, as, although we have reduced our carry-forward by £2000, we have added to reserve and other funds the interest they have earned, amounting to nearly £5000, and this after paying the slightly higher dividend of £6 2s. 6d., instead of £5 17s. 6d. p.ct. Some of you are aware that, for the last half-year of 1926, the dividend we are entitled to pay is £6 10s. p.ct.; but we suggest to you one of £6 2s. 6d. p.ct. In October last, the Board of Trade, on our application, increased the standard price by 1d. per therm. This was not, however, granted to enable us to pay larger dividends, but to help us to pay the increased cost of coal; and we are not taking the advantage we might have done to increase the dividend beyond the £6 2s. 6d. p.ct. We are entitled to that because we reduced the price in 1926 before the coal stoppage.

ELECTRICITY.

With regard to the charge for electricity, the Company, as was contemplated, have been taking a large quantity of electricity in bulk from the North Metropolitan Electric Power Supply Company, under an agreement dated Sep. 19, 1922, where again the sliding-scale principles, in so far as they relate to the cost of coal, have been incorporated. No increase was made in the price of electricity until October, 1926, and then only by one farthing per unit. A further increase of one farthing per unit was notified to be levied as from Christmas, 1926;-but this notice has since been cancelled—as also in the case of the gas price increase. It has been stated by the Electric Supply Company that the consumers of electricity have borne no increase at all: but people like ourselves taking supply in bulk have certainly to bear the full proportion of the increased cost of generation. The electricity side of our undertaking continues to increase; and you will see that the revenue profit is greater by £400.

GAS LIGHTING IN 48 P.CT. OF NEW HOUSES OCCUPIED.

During the year under review the number of gas consumers increased by 2820—1310 being ordinary consumers and 1510 taking gas by coin meter. Practically all new houses in the district are supplied with gas in one form or another. I think you will be interested to know that of the new houses occupied in 1926, 48 p.ct. took gas for lighting, and 97 p.ct. had gas cookers. It may surprise you to hear that in nearly half the new houses gas is used for lighting. It only shows how important this side of our business is, and that we still retain a large amount of our lighting load in spite of electrical competition.

CO-PARTNERSHIP AND PENSION FUND.

You will notice that the cost of co-partnership is increased by £700, and the increased cost of the pension fund is £200. In addition, there is the cost under the Widows', Orphans', and Old Age Contributory Pensions Act of nearly £1200. The last item is a new one, and we are not altering our pension fund in consequence; but we have reserved to ourselves the right at any time hereafter to reduce the amount of pension provided by the Company, should any addition be made to the compulsory Government scheme. This would not affect the rights of existing pensioners. The increase in cost of co-partnership is due to increase in numbers and bonus. With regard to the pension fund, this has been operative for three years. The pensioners now number 38, and the cost is £3718 per annum. The balance of this fund is £116,339, an increase during the year of £15,000; and of this nearly £55,000 is invested outside the Company. This is more than the actual amount contributed by the employees, which your Directors felt should be separately invested. The fund is actuarially sound, and is one which is of the greatest value, and much appreciated by the staff and employees.

Before concluding, I again pay tribute to our staff and workmen. There is a thoroughly good spirit throughout the Company, and the goodwill existing has been clearly evidenced during the year just passed. Our chief officials, Mr. Smith and Mr. Fussell, always take the optimistic view; and in spite of all our difficulties, they went cheerfully on their way undismayed. It is said that good masters make good servants; and I know your Directors try, as you would wish them to do, to be good masters, and to show proper recognition and appreciation of good work and good service.

I now beg to move:

> "That the report of the Directors and statement of accounts for the year to Dec. 31, 1926, be received and adopted, and that the report be entered on the minutes of the proceedings of this day."

Mr. G. HAY MORGAN, K.C., B.Sc., in seconding the motion, said he thought he might, on behalf of the proprietors, thank the Chairman for the very lucid way in which he had put the position before

the meeting. There was always a quietude and reserve about Mr. Woodall's speeches, and no exaggeration. They might therefore fairly conclude that the position of the Company was a great deal better even than he had indicated. So far as other people were concerned, too, Mr. Woodall was always scrupulously fair, and prepared to accept blame himself rather than impute it to others. The report was an exceedingly good one, particularly in view of the conditions of the past year. To be able to maintain the dividend at the rate of £6 2s. 6d. p.ct. was a fact upon which they were entitled to congratulate themselves—as well as upon not having raised the price of gas more than 0·4d. per therm. They could look forward to the future with great confidence. Houses were being put up rapidly; and the output, which was increasing year by year, seemed likely to continue to do so for a very long time to come.

Mr. PARDY added his congratulations, and expressed the indebtedness of the proprietors to all those who had worked so hard in their interests.

The report and accounts were then unanimously adopted.

DIVIDEND RECOMMENDATION.

The DEPUTY CHAIRMAN (Mr. Henry Bailey) then moved:

"That the dividends paid on Aug. 12, 1926, in respect of the half-year ended June 30, at the rate of 5¾ and 5 p.ct. per annum on the preference stocks, 7¼ p.ct. per annum on the 'A' stock, and 6¼ p.ct. per annum on the 'B' stock, all less income-tax, be and are hereby confirmed.

"That a dividend at the rate of 5¾ and 5 p.ct. per annum on the preference stocks, 7¼ p.ct. per annum on the 'A' stock, and 6¼ p.ct. per annum on the 'B' stock, all less income-tax, be declared for the half-year ended Dec. 31, 1926, payable on and after March 1 next, and that the dividend warrants be sent to the proprietors by post."

Mr. W. A. SURRIDGE seconded the motion, which was agreed to.

RE-ELECTIONS AND THANKS.

The CHAIRMAN said it was now his pleasant duty to propose the re-election as a Director of Mr. Henry Bailey, their Deputy Chairman, who had been a Director for 32 years. His long experience was of the greatest advantage to the Board.

Mr. THOMAS GOULDEN seconded the proposal, which was carried.

The CHAIRMAN next moved the re-election as a Director of Mr. William A. Surridge; remarking that his special knowledge of coal matters was of much value to his colleagues.

Mr. A. E. BROADBERRY seconded, and the resolution was agreed to.

Moved by Mr. J. TAYLOR, and seconded by Mr. A. W. S. REID, the retiring Auditor (Mr. John Eve) was re-appointed.

Mr. EVE, returning thanks, said he had been Auditor to the Company since 1913; and from that time right up to the present he had seen how well, how carefully, and how efficiently the accounts were kept. Although the business had grown very much since 1913, the accounts still manifested all the qualities he had named. He considered the balance-sheet now presented a wonderful one. The proprietors ought to pass a special vote of thanks to the Directors and staff for the manner in which they had managed the Company's affairs during the past year.

The CHAIRMAN pointed out that Mr. William Cash was retiring from his position as Auditor to the Company; and it was proposed that Mr. William Cash, Jun., should be appointed in his place. Mr. Cash had served them excellently; and the Directors felt sure his son would do so also.

Mr. PARDY thereupon moved:

"That Mr. William Cash, Jun., M.A., F.C.A., be and is hereby appointed one of the Auditors of the Company, to fill the vacancy caused by the resignation of Mr. William Cash, F.C.A., and that his remuneration be at and after the rate of £200 per annum."

He remarked that it was very important that they should have an exceptional Board of Directors, but at the same time it was equally necessary that they should have capable Auditors. Many of them knew Mr. Cash, Sen., as the principal member of the firm of Messrs. Cash, Stone & Co., who had served the public extraordinarily well for many years.

Mr. SANDELL seconded the resolution, which was unanimously passed.

Mr. WILLIAM CASH, Jun., returning thanks, said that for ten years he had been a partner in his father's firm, and he trusted that the experience he had thereby gained would enable him to earn in years to come some measure of that confidence and respect of the proprietors which he knew his father had enjoyed in the past.

Mr. W. G. BROWN proposed that the best thanks of the proprietors be given to the Chairman, Directors, and Auditors, and also to the officers, staff, and workmen, for their services during the past year. All, without exception, had, through a very difficult period, done their best in the interests of the Company.

Mr. H. MITCHELL seconded the proposition, which was carried by acclamation.

The CHAIRMAN thanked the proprietors for the vote, and said it certainly had been a year of very great difficulty and anxiety; but the staff and workmen had done splendidly. No company could have a more loyal body of men. A pension fund such as was started by their Company fourteen years ago, of course, meant a good deal. Three years ago it became operative, and now they had a number of men who were receiving pensions. It was realized, therefore, that the Company was well worth serving well. The staff, too, seemed to take more interest in their work, and pride in the Company, than ever.

Mr. FUSSELL, acknowledging the vote on behalf of himself and his staff, remarked that the Chairman had called Mr. Smith and himself optimists. Taking the gas industry as a whole, he thought nearly 100 p.ct. of it was optimistic, in spite of the fact that its keenest competitor had the support of the Government. Every member of the staff would appreciate the vote, and regard it as a just reward for work well done throughout a most anxious time. All were extremely glad that 1926 was behind them.

Mr. HAROLD C. SMITH (the Chief Engineer), on behalf of himself and the engineering staff and workmen, said it was a source of pride to them that they should have been able to maintain through all the difficult times of the past year a full supply of gas of statutory quality and at statutory pressure.

REDUCTIONS IN THE PRICE OF GAS.

Accrington.

At a meeting of the Accrington District Gas Board on Feb. 24, Mr. A. J. Harrison, the General Manager, reported on the cost of the coal dispute. It was decided to make an all-round reduction, as from April 1 next, equal to 6d. per 1000 c.ft. The gross value of the reduction over the year equals about £12,000. Two advances in charges were made during the dispute, and the new rates represent an increase of about 9 p.ct. over those in operation previously. When the dispute commenced, the Board had in stock 7887 tons of coal valued at £10,647. From April 1 to Dec. 31 26,359 tons were purchased at a cost of £70,116, making the total outlay £80,764. Extra cost of labour brought the amount to £83,045. Deducting sales, &c., the cost of coal used from April 1 to Dec. 31 was £78,092. Mr. Harrison estimated that the value of coal required under normal conditions would have been £34,742. Thus the gross cost due to the dispute was £43,349. The net deficit on the year ended March 31 was estimated at £8834. To maintain the present rates until March 31, 1928, would increase the revenue by £24,000. To reduce the rates from April 1 by 6d. per 1000 c.ft. would absorb £12,000. If the reduction was made, it was possible that the deficit would still be cleared.

Banff.

In Banff, the price of gas has been reduced by 10d. per 1000 c.ft.

Heywood.

It has been decided to reduce the price at Heywood from 5s. 6d. to 4s. 9d. per 1000 c.ft.

Maidstone.

The price has been reduced to ordinary consumers by 2d. per therm—from 11·6d. to 9·6d. The latter figure is the rate which was in force prior to the coal strike.

Plymouth Corporation.

A reduction in the price of gas to ordinary consumers from 3s. 6d. to 2s. 10d. per 1000 c.ft., as from the March readings, was decided upon by the Plymouth Corporation Gas Committee on Thursday, Feb. 24.

Swansea.

At the annual meeting of the Swansea Gas Light Company, the Chairman (Mr. Ernest H. Leeder) announced that, as from the meter readings at the end of the current quarter, the price of gas would be reduced 2d. per therm.

Road Tar and Fish.

In the "Observer" for Sunday, Feb. 27, the following letter from Mr. Henry Woodall appeared. "Some fifty years ago I had occasion to visit a certain gas-works in Yorkshire, to arbitrate between a company and a contractor, when, in my scrutiny of the premises, I was surprised to find that tarry matter was oozing through a boundary wall, and falling into a stream at its base. I called the attention of the manager to the circumstances, and found him quite undisturbed by the impeachment. 'What harm in that?' said he. 'What harm in that? Why, of course you are killing the fish!' 'Not at all,' said he, 'for they seem to like it!' 'How can you think that?' 'Because they live in the wall; we have a man who tickles for them.' Now, I happened to know of 'tickling for trout' as an ancient pastime referred to by Shakespeare as common in his day; and I expressed a wish to see it. The man was called, and having divested himself of boots and socks, he slid down the wall, put his hand into a hole, and within a minute drew up a 4-oz. trout. He continued the sport, with a yield of one a minute, until I wearied of it. I gave him a shilling, and said to the manager, 'I suppose he may take the fish?' when the man interposed with the exclamation, 'Oh, they are not fit to eat, they stink o' tar!' Whereupon I picked one up, and quickly dropped it, for indeed the clever poacher had spoken truly!"

At Barnstaple on Monday, Feb. 21, 10 "A" shares and 53 "B" shares in the Barnstaple Gas Company, all fully paid with a nominal value of £10 each, were offered for sale by auction, and fetched from £15 to £15 7s. 6d. for the "A" shares, and from £10 2s. 6d. to £10 10s. for the "B" shares.

Councillor J. C. Wilson, Chairman of the Morecambe Corporation Gas Department, in moving the minutes of the Gas Department, drew the attention of the Council to the following minute concerning Mr. Walter Hodgson, Distribution Foreman. "The Gas Engineer reported that Mr. W. B. Hodgson would shortly complete 51 years in the service of the gas undertaking; and it was resolved that this Committee desire to place on record their high appreciation of the faithful and valuable services rendered by Mr. Hodgson to the undertaking, and to express their sincere wish to continue in that office."

BOURNEMOUTH GAS AND WATER COMPANY.

ORDINARY GENERAL MEETING.

The Ordinary General Meeting of the Company was held on Thursday, Feb. 24, at the London Offices, No. 48, Copthall Avenue, E.C.—Mr. WILLIAM CASH, F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the last annual meeting; and the Directors' report and statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that when he addressed the proprietors in that room a year ago, they were faced, as probably would be remembered, with the difficulty then existing in the coal industry; and, as he had stated on that occasion, he, along with many other people, entertained hopes that a reasonable settlement would shortly be arrived at. Instead of this, they were in due course confronted with two very serious matters. The first of these was the general strike, which took place on May 3; and the second was the coal stoppage, which extended over so long a period. The general strike, the shareholders would be glad to know, did not create any difficulty so far as their Company were concerned. While there were rumours in Bournemouth that the Company's employees were coming out, these were entirely falsified; and the news was broadcast by the General Manager that the men intended to stick to their jobs and carry on.

LABOUR CONDITIONS IN THE GAS INDUSTRY.

During the coal stoppage, also, the Company had the satisfaction of furnishing a full supply of both gas and water without intermission. The employees all through had worked exceedingly well; and he could not help thinking that this good work and the fact that there was no stoppage were due mainly to two things. The first of these was the system of co-partnership, which had been in existence in their Company for a good many years now; and the second was that in the gas industry generally there existed Whitley Councils. So far as their own Company were concerned, they came under the Joint Industrial Council for the Southern Area of England; and he had the honour of being Chairman of this Council. Gas was so necessary a commodity in modern life that this Company, along with other gas undertakings, had no hesitation in taking all requisite steps to carry on regardless of cost.

COAL SUPPLIES AND COSTS.

At the commencement of the strike, they had something like three months' stock of coal in hand; and they were more fortunate than some companies in that, having water carriage to Poole, they were able to get Continental coal comparatively easily, except in the matter of price. They bought coal from Silesia, Czecho-Slovakia, Poland, and lastly America. Nevertheless, the Directors had a very anxious time, particularly during the latter part of the stoppage. While he would like to record that they had great assistance from their factors and others who supplied coal, the continual necessity for making purchases, not knowing how much and what class to buy, and so forth, had given rise to a great deal of worry and trouble. At the end of 1926, they had still in stock about 6800 tons of coal; a considerable proportion being American coal, some of which had cost as much as 71s. per ton, compared with a contract price before the strike of something like 30s. a ton. This coal had been valued for the purposes of the accounts at 40s. a ton, which was less than it cost, but still 10s. a ton more than if it had been supplied under their then existing contracts. Therefore, to this extent, the current half-year would be adversely affected. Over the whole year, the gross cost of coal had been 10s. a ton more than in 1925; and after deducting the return from residuals, the cost was nearly 5½d. per 1000 c.ft. more than in the preceding twelve months.

PRICE OF GAS.

Some people seemed to think that the whole of the cost of such a stoppage as they had been through could be met by increasing the price of coke—that a gas company could get it back from residuals. He would point out, however, that they had had to use a larger proportion of their coke in making carburetted water gas, in order to save to the utmost the coal that was available. Naturally, therefore, the extra cost had ultimately to be met by an increase in the price of gas. From the Michaelmas quarter they increased the price by 1·1d. per therm, from 9·5d. to 10·6d. In other words, they put the price up 5d. per 1000 c.ft. for three months only, while the net addition to the price of coal over the whole year amounted to 5¼d. per 1000 c.ft. At the same time, the Board were happy to be able to inform the proprietors and the consumers that, as from Lady Day next, they had decided to reduce the price by 0·6d. per therm, which would bring it down again to 10d. This would make it only ¼d. per therm, or 2¼d. per 1000 c.ft.—in other words, 5¼ p.ct.—more than the price was before the stoppage. As to whether at midsummer they would be able to come down still further, he would not like to speak definitely at the present moment. The Company had coal contracts which should have been operative from June, 1926. These would be carried forward, and their factors and collieries would deliver the coal over an extended period. Covering the whole year, the increased price of gas, in comparison with the previous year, was only a little over 2¼d. per 1000 c.ft. Residuals had helped somewhat in this connection, but not to a large extent. The General Manager, during the coal stoppage, did all he could to assist their coke consumers, such as bakers and others; and the Company even bought a certain amount of coke in order to help those people they could not supply out of their own stock.

THE ACCOUNTS.

Turning to the water side of the business, he might say that the receipts were up £1663, and they had managed to retain £581 as additional profit, and this with a quantity of water which was not materially greater than in 1925. There would be noticed in the accounts, a repetition of the special appropriation appearing a year ago for the co-partners' pension fund—£4100 in the gas revenue account, and £900 in the water revenue account, making a total of £5000. These appropriations were in order to make the fund actuarially sound. The fund now stood at some £78,000, and was still intact, because pensions were not yet chargeable. Taking the year's accounts, the gas profit was down £8337, and the water profit up £581, so that they were worse off by £7756. With a growing business like theirs, and the capital expenditure they had been incurring during the last few years, the charge for dividend was up £7074, and the charge for interest was more by £1236. So they had £16,066 to find under these three heads. The carry forward had been reduced by £11,565, whereas a year ago it was increased by £4506. These two sums together made up the £16,000 of which they were short. He ventured to suggest that, having regard to the difficulties of the past year, the Bournemouth Company were to be congratulated upon the fact that they had come through the year 1926 so well. The Directors proposed to pay the same dividend as a year ago, and only found it necessary, as he had said, to reduce the carry forward by a little more than £11,500.

POSITION AND PROSPECTS.

As to the state of the business, it would be seen that the sales of gas showed an increase of 6·84 p.ct., which was satisfactory, when one considered that through the latter part of the autumn they were asking their consumers to economize. The increase he had mentioned meant, in quantity, another 132 million c.ft. sold. At the beginning of 1926 there were 334 houses being built, and during the year a further 1245 were started, making a total of 1579. Of these, 831 were piped for gas only, while 748 were both piped for gas and wired for electricity. Thus in more than one-half of these new houses gas only would be installed, and in the others gas was side by side with electricity. This was very good testimony to the work which their Distribution Department and the General Manager were doing. They had put into these new houses over 12,000 points for gas supply. The new showrooms and offices in the centre of Bournemouth were now nearly completed; the showroom at New Milton had been completed; and the Board had decided to provide a really adequate showroom at Beechhurst, Poole. Nothing they were proposing to do under the last-named scheme would detract from the charm of the old building which at present was their showroom there. Sales of fittings again showed an increase, and amounted to nearly £60,000. The profit on the sale of fittings was rather more than a year ago. There had been a great demand for gas stoves, and such like apparatus, especially during the period of the strike. As regarded the future, they would have to add to their pressure filters at Longham. Those already put in (which were by way of experiment) were working very satisfactorily. The putting-down of a new gasholder to contain 5 million c.ft. had been begun. The new Pitwines Works had been in operation during the year, with a daily capacity of 2¾ million c.ft. of coal gas and 2 million c.ft. of water gas. The new works at Pitwines had proved to be amply justified, and were doing excellent work. A most interesting article dealing with these works appeared in a recent issue of "Engineering." Speaking from the point of view of the industry as a whole, one was interested to learn that the new Electricity Act had come into being; but so far as he could gather, the electrical industry itself did not appear to be vastly enthusiastic as to the results likely to accrue from it. However this might be, he would say once more, as he had done many times before, that there appeared to be room for both gas and electricity. Of course, the competition became keener as the price of electricity went down, which made it all-important that the price of gas should be reduced to the lowest possible figure. In this respect, perhaps, the matter was more serious for some of the smaller concerns than it was for a company such as theirs—particularly one associated with the supply of water also. There was every reason to believe that the growth of the Company's business would continue in 1927. They would certainly get relief in the matter of coal prices; but the outlook for residuals was not too hopeful.

The DEPUTY CHAIRMAN (Sir Charles L. Morgan, C.B.E.) seconded the motion, which was carried unanimously without discussion.

DIVIDEND AND RE-ELECTIONS.

An interim dividend at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8½ p.ct. on the original shares was paid for the half-year to June last; and on the proposition of the CHAIRMAN, seconded by Sir CHARLES J. JESSEL, Bart., a dividend at the same rates for the second half-year was declared.

The CHAIRMAN proposed the re-election of Sir Charles Jessel as a Director of the Company, remarking that he had served the Company admirably for many years, and that his name was well known in the gas industry as well as in other spheres.

Lieut.-Col. H. W. WOODALL, C.I.E., seconded the resolution, which was carried.

The CHAIRMAN next proposed the re-election as a Director of Sir Charles Morgan, of whom he could say exactly the same as he had said of Sir Charles Jessel.

Mr. E. HONORATUS LLOYD, K.C., seconded this, and it was agreed to.

Moved by Dr. J. H. RODMAN, and seconded by Mr. R. CUFF, the retiring Auditor (Mr. R. H. Glen, F.C.A.) was re-appointed.

EXTRAORDINARY GENERAL MEETING.

PROFIT SHARING AND PENSION FUND.

An Extraordinary General Meeting of the Company was then held for the purpose of taking into consideration and, if thought fit,

adopting on behalf of the Company, with or without amendment, (*a*) certain alterations and amendments in the rules governing the Company's profit sharing scheme and (*b*) certain alterations and amendments in the rules governing the pension fund for the co-partner employees of the Company.

The CHAIRMAN, in the course of a full explanation of the proposals, pointed out that the co-partnership scheme had now been in operation for a considerable number of years, having been started in 1917. In the accounts that had just been passed, it might have been noticed that during the past year some ordinary shares had been issued; and under the provisions of the Company's last Act of Parliament these were issued direct to the co-partners. The Directors were very glad to be able to do this, because they were sliding-scale shares the dividend on which varied with the price of gas, and thus in a double sense the employees became co-partners. The employees worked well during the difficult period of last year, with the result that the dividend remained unchanged, and consequently the co-partnership bonus was also unaltered, inasmuch as the two were co-related. The alterations which the Board were now asking the proprietors to sanction were really due to the new legislation which affected old-age pensions. Under this new legislation, the Company had to contribute an additional sum; while the workpeople also had to pay more weekly, and received further benefits. The suggested alterations had been considered by the employees, who were quite content that they should be made. The Board also considered them fair. He therefore moved a resolution that they be adopted.

The DEPUTY CHAIRMAN seconded the motion, with the remark that, in framing the new rules, the greatest possible care had been taken to be fair to both sides.

The resolution was unanimously carried.

VOTES OF THANKS.

The CHAIRMAN, proposing a hearty vote of thanks to the Engineer and General Manager and his assistants, the Secretary, officers, and workpeople for their services during the past year, said that never was such a vote so appropriate as on the present occasion. The officers had had an exceedingly difficult and worrying time; and the Engineer had also had the bringing into complete use of the Pitwines Works. The workpeople, too, deserved special thanks, in the circumstances which he had already explained Any idea of interfering with the gas industry at the time of the general strike was nullified very materially by the nature of the relationship existing between the workpeople and their employers; and this good relationship was fostered by co-partnership and the other benefits bestowed upon them.

Mr. H. G. PALMER, seconding, said he had thoroughly enjoyed a recent visit to the Pitwines Works. What he saw convinced him that both shareholders and consumers should have confidence in those in charge and the men who worked there.

The resolution was heartily passed.

Mr. PHILIP G. G. MOON (the Engineer and General Manager), in acknowledging the vote, said that to know one's efforts were appreciated was very pleasant always, but when such appreciation found expression in the generous terms employed by both the Chairman and Mr. Palmer it became even more pleasant. The vote would encourage all of them to strive to do better still in the fuutre. He was quite sure that everyone in the service of the Company would wish him to offer thanks for the vote. It had been a very difficult time for the country generally, and particularly to any industry needing, as did the gas industry, coal in large quantities as its raw material. Those in the service of the Bournemouth Company had been called upon to bear their share of the common load; and he was very glad to be able to report that the men had responded splendidly to the call made upon them. ["Hear, hear."] There had been no shadow of hesitation; and perfect goodwill had reigned throughout. The feeling among them all was that they had contributed by their efforts to the welfare of the nation. They were a very happy family—proud of the Company, and of the Directors, in whom they had complete trust. So long as these conditions prevailed, the Board could look forward with every confidence to continued efforts towards a greater efficiency on the part of everyone.

The Chairman and Directors were thanked for their services on the proposition of Dr. RODMAN, seconded by Mr. R. H. GLEN.

HORNSEY GAS COMPANY.

ANNUAL GENERAL MEETING.

Cheap Gas Again.

The Annual Ordinary General Meeting of the Company was held last Friday, at 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. K. Leslie Mortimore) read the notice convening the meeting; and the Directors' report and the statement of accounts for the year ended Dec. 31 were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that of all the gas undertakings which had hitherto disclosed the condition of their affairs as relative to the period which they were about to consider, and the industrial disturbance which it comprised, very few showed less loss, damage, or disparagement than the Hornsey Gas Company. He used the three terms advisedly. First as to loss. This was what one would expect to see in the trading account for the year. Damage he regarded as a more permanent form of injury or disturbance which had to be carried forward as something to be liquidated in the future. Then what he meant by disparagement was a disturbance of the conditions existing between the consumers and the administration by reason of the price which the Company had had to impose in order to meet the injury inflicted upon the undertaking. In all these respects he thought the shareholders had good grounds for congratulating themselves on the condition of affairs as reflected in the report and accounts now submitted.

EXPANSION IN BUSINESS.

The first item of the report to which he would draw attention was that which stated that there had been an increase in the Company's business of 5·2 p.ct. This was somewhat larger than they had been accustomed to, because they had not in their district illimitable possibilities of expansion, such as were possessed by some districts on the outskirts of London. Theirs was a comparatively small district, and shut in; and although there was a certain amount of new building to be anticipated, the main increase which they could hope for would arise from the alteration of existing premises and their adaptation to modern requirements—or, to put it shortly, the change-over from single dwellings into tenement houses. It was therefore a gratifying increase to report; but what would be of equal interest to the proprietors was the fact that since the beginning of the present year this rate of increase had not only been maintained, but very considerably augmented. There was, too, every prospect of maintaining this enhanced rate of development through the current year.

PRICE OF GAS.

Another item which called for notice was that dealing with the increase in the price of gas. This was important, because it informed them of the measures which the Board had been compelled to adopt to protect the Company from the effects of the coal strike. It would be seen that they had been only obliged to increase the very low price of 8½d. per therm to the maximum of 9·6d. This maximum was considerably less than what would be the reduced price of a good many undertakings round London, and was a maximum that fell considerably short of what far more important companies, under more generally favourable conditions, were compelled to impose. Therefore he thought that on this account they had reason to feel satisfied.

THE ACCOUNTS.

Coming to the accounts themselves, the first two statements related to capital, and were a little more involved, and in a somewhat novel form, because of the consolidation of capital which had recently been carried out. The first table revealed the cardinal fact that there was over £120,000 of ordinary capital unissued and at their disposal with regard to the future. The second statement was not quite so clear, and would appear in another form on subsequent occasions. It stated that there had only been raised £46,000 of debenture stock; and incidentally this was all raised at 4 p.ct., whereas one found in some contemporary accounts awkward entries relating to 7 and 7½ p.ct. Their debenture stock was issued more than seventeen years ago; but inasmuch as under their new Act there had been created fresh powers with reference to debentures, they had authority to issue a further £105,000 of debenture stock. Thus, in both these matters they were armed with all possible provision for the future. This was of rather more importance than might appear at first sight, because it meant, to a certain extent, immunity from the necessity of making another pilgrimage to Whitehall. The total capital expenditure amounted to a little under £280,000, and this brought the outlay per million c.ft. of gas to something like £350—an extraordinarily low figure. Before passing from it, he would like to make one or two comments on this point. This figure of low capital per million c.ft., provided that it was associated with an efficient upkeep of works and a proper complement of physical assets, was the first criterion of the results of a gas undertaking, whether one looked at it from the consumers' point of view or from the point of view of the proprietors. If the figure was low, it meant that one only required a limited amount of money for interest and dividend, and to this extent the price of gas was favourably affected. There was also another point of view—namely, that of the investor. That an undertaking did not employ an excessive amount of capital, and was selling gas at a low rate, constituted an attraction to an investor; while the opposite to these qualifications would tend to deter him from investing.

AN ANOMALY.

But here they were confronted with an anomaly. When it came to the question of determining a standard price, and application was made to the proper Government Department to decide what the figure should be, the fact that the undertaking had a low capital (which meant good management and administration) and was selling gas at a low price constituted an indictment, with the result that the reward for good management in the public interest was the granting of a more limited standard price; and the margin of operation was restricted. Thus, what should legitimately attract the investor was made to repel him. Surely there was something very wrong in all this. As matters stood now, the best condition precedent to an application to the Government Department was a thoroughly bad state of accounts, a high price of gas, and a high capital per million c.ft., the reward of which was a high standard price. He really did think that the proper Government Authorities should take cognizance of this unsatisfactory state of things. It

constituted a miscarriage in equity, and at the present time vitiated the whole atmosphere between the gas undertaking and the public. Therefore he hoped that it would receive the careful consideration of the Government.

GAS REGULATION ACT DEFECTS.

There was also another direction in which their "house might be set in order," and this was with regard to the Gas Regulation Act. Of course, he was aware of the difficulties existing at the time it was framed; but he must say that it was very far from being a satisfactory Act in its operation. Apart from the points to which he had referred, its prescriptions and limitations—the things that it prohibited the Board of Trade from taking into consideration when dealing with gas undertakings—in themselves constituted a very serious defect. A great many circumstances could not be considered—and were not considered—which ought to be taken into account by any Department that had a discretionary and judicial duty to perform in this regard.

MORE FIGURES FROM THE ACCOUNTS.

The revenue account referred to an abnormal period; and comparisons, which were always invidious, were not even useful on the present occasion. On the debit side, on the first two items—coal, and oil and coke used in the manufacture of water gas—they had spent some £26,000 more than in the previous year, most of which was attributable to the difficulties engendered by the coal strike; and it was a peculiar thing that, going right through the account to the bottom, this was the figure representing the excess expenditure over 1925; the total expenditure being £26,050 more. This showed that the disturbance to the financial position was almost wholly attributable to the coal strike. It was necessary to buy coal as and when they could; and the extra cost of coal alone was nearly £14,000. This was not the end of the trouble, because an additional burden was thrown upon the production of carburetted water gas; and the cost of oil, by reason of the larger quantity used, also went up. The maintenance charges had been adequately provided for, with over 1s. per 1000 c.ft. On the other side of the account, the sale of gas and rentals of meters, stoves, and fittings had brought in £13,707 more, by reason of the increase in the price of gas and in the business done. Residuals realized £5658 more, and the total increase on this side of the revenue account was £19,760, against the increase in expenditure of £26,050. This left a balance of £6290 to be accounted for; and it had come out of the profits, which were less to this extent. There was brought into the profit and loss account £17,715; and there was being carried forward £12,593. The difference eliminated the whole of the loss, disability, and damage done by the coal strike, without disturbing any of the invested funds. He thought there were very few companies who had emerged from these difficulties at so small cost. Some companies were carrying forward a certain proportion of the dear coal purchased during the strike, so that 1927 in many cases started with a loss yet to be made good. This was not so with them, as the total cost of the coal had been charged against the past year. Before arriving at the final result of the account to which he had referred, the Company had paid stamp duty on increase in nominal capital, to the extent of over £1000. The co-partnership appropriation was £1679; and of all the various items on this side of the statement, he counted this to be the most beneficial expenditure for which the Company had been responsible. It was from this that they derived the greatest measure of return. The past year provided actual experience of what disturbed conditions between capital and labour meant. In the conduct of the business the Directors met with many troubles, but, by virtue of co-partnership, this was one they did not meet with. Co-partnership not only benefited those who practised it, but it prevented them being a nuisance to every one else in the industrial world. There was no more important safeguard to civic peace during the crisis in May than the attitude of the gas undertakings generally. This attitude was almost entirely induced by the spirit of co-partnership, which he was sorry to see was becoming so much a monopoly of the gas industry. In the balance-sheet there was a loan from the bank of £9000; but this was an item which would doubtless adjust itself. The expansion in the Company's business would, as far as he could see, necessitate an issue of capital in due course. The price of gas would be reduced from 9·6d. to 9d. per therm at the end of the current quarter. It would be a surprise to him if the development of the Company was not more marked during the current twelve months than had been the case for many years past.

The DEPUTY CHAIRMAN (Mr. G. W. Carey) seconded the motion, and it was passed unanimously without discussion.

THE DIVIDENDS.

On the motion of the CHAIRMAN, seconded by Mr. F. H. JONES, it was agreed:

> "That there now be declared dividends for the half-year ended Dec 31, 1926 (being the final dividends for the year), as follows: On the preference stock, 5 p.et. per annum; on the 5 p.ct. stock, 6¼ p.ct. per annum; and on the 3½ p.ct. stock, 5 p.ct. per annum—all less income-tax (making with the interim dividends already paid on the 5 p.ct. stock and 3½ p.ct. stock respectively 6¼ p.ct. and 5 p.ct. for the year); and that such final dividends be paid on March 4."

RE-ELECTIONS AND VOTES OF THANKS.

The CHAIRMAN proposed the re-election of the retiring Directors—Messrs. G. W. Carey and F. H. Jones. No members of the Board, he said, had contributed more than these two gentlemen to the excellent results to which he had drawn attention.

Mr. T. W. SEAGER BERRY seconded the motion, which was agreed to.

The retiring Auditor (Mr. E. L. Burton) was thereafter re-appointed.

The CHAIRMAN proposed a hearty vote of thanks to the Engineer and General Manager, the Secretary, the other officers, and the staff generally for their services during the past year. They had, he said, in Mr. Buckley and Mr. Mortimore, two very devoted servants; and they, in their turn, had equally devoted staffs. Mr. Buckley did far more than could ordinarily be expected of an officer in his position. He was most assiduous in his work. In his earlier remarks, he had told the proprietors of the economies in the working. Sometimes he wondered how Mr. Buckley accomplished these better and better results. But as each year came round, and fresh difficulties had to be surmounted, so Mr. Buckley revealed new aspects of his brilliant administration. In Mr. Mortimore they had a valuable officer in every way.

Mr. F. H. JONES seconded the motion; remarking that he knew of no gas undertaking which had more value for the capital spent than the Hornsey Company; and this result had only been achieved by very hard work on the part of everybody concerned. He entirely associated himself with what the Chairman had said regarding the "reward" that was meted out to well-managed undertakings. A company that was really well managed, and for which everyone did his very best, never seemed to come "out of the fire" as well as one that "sat down and twiddled its thumbs."

Mr. K. R. MACKAY said he would like to support the resolution. As one of the Company's consumers, he was in a position to bear testimony to the courtesy and prompt attention which was invariably received from all the Company's officials.

Mr. J. W. BUCKLEY, M.Inst.C.E. (the Engineer and General Manager), asknowledging the vote, said it was impossible for any official to appreciate more thoroughly the kind expressions of the Chairman and Mr. Jones than he did; and he was quite sure that in stating this he echoed the feelings of everybody connected with the Company. It was very gratifying to see so satisfactory an amount standing to the credit of the co-partnership, taking into consideration the comparatively short period during which the Company had been practising this excellent system. They had the loyal co-operation of the Co-Partnership Committee; and if the Committee continued to act up to the highest principles of co-partnership, the Company would prosper, year by year, to an extent that had never been known before.

The SECRETARY also briefly responded; and the proceedings were brought to a close by a vote of thanks to the Chairman and Directors, which was accorded on the proposition of Mr. BODKIN, seconded by Mr. F. W. CROSS.

ELECTRICITY AND EXPLOSIONS.

In our last issue (p. 464) paragraphs appeared referring to two gas explosions—one at Hackney on Feb. 17, and one at Acton on Feb. 19. The reports were so framed as to imply that gas was to blame. In both cases investigation has shown the implication to be unwarranted. At Hackney the gas producing the explosion was coal gas; but the escape was caused by the fracture of a 4-in. gas-main by workmen of the Electricity Department of the Hackney Borough Council, who were using a thrust borer preparatory to laying a service across the road. With regard to the explosion at Acton, all the evidence given at the inquest on the 23rd ult. goes to show that the explosion was due to bitumen gas generated by the fusion of a feeder cable in the road.

THE SHEFFIELD REDUCTIONS.

Through damage to type in the paragraph which appeared on p. 437 of last week's issue, under the heading "Is this the Lowest Industrial Price?" some of the figures present a false appearance. To set the matter right, we cannot do better than reproduce the official notification of the reductions as issued by the Sheffield Gas Company. It is as follows:

For gas supplied in quantities up to 500 therms, 7⅞d. per therm, or equal to 3s. 1d. per 1000 c.ft.
For the excess beyond 500 therms up to 2500 therms, 5⅞d. per therm, or equal to 2s. 5d. per 1000 c.ft.
For the excess beyond 2500 therms up to 15,000 therms, 5⅞d. per therm, or equal to 2s. 4d. per 1000 c.ft.
For the excess beyond 15,000 therms up to 30,000 therms, 5⅜d. per therm, or equal to 2s. 3d. per 1000 c.ft.
For the excess beyond 30,000 therms, 3⅜d. per therm, or equal to 1s. 6d. per 1000 c.ft.

For all gas consumed in any one year on one and the same premises.

The reductions will have effect as from the March meter readings.

The Shipley Urban District Council have accepted the tender of the Standard Furnace and Setting Company, of Southport, for re-setting three retorts at the gas-works.

For breaking-open an automatic gas meter in his house, and extracting £1 2s. 9d., Thomas Barclay was fined £1, or ten days' imprisonment, at the Dumbarton Police Court.

At a recent meeting of the Dundee Gas Committee, the tender of Messrs. Robert Dempster & Sons, Ltd., of Elland, for new purifiers of a capacity of 5 million c.ft. per diem, was accepted.

A workman named A. Bond, in the employment of Messrs. Clayton, Son & Co., Ltd., of Leeds, who are carrying out a contract at the Devonport Gas-Works of the Plymouth Corporation, met with an accident on Wednesday, Feb. 23. He was engaged on one of the gasholders, when a piece of steel flew into one of his eyes. First aid was rendered by the St. John Ambulance men, and Mr. Bond was then conveyed to the Royal Eye Infirmary, where it was found necessary to remove the injured eye.

GAS COMPANIES' RESULTS FOR 1926.

Croydon.

Moving the adoption of the report and accounts at the annual meeting of the Croydon Gas Company on Feb. 25, Mr. William Cash, the Chairman of Directors, said that it was a matter for considerable congratulation on the part of all concerned that neither the Croydon Gas Company nor the gas industry as a whole were involved in the general strike. So far as their Company were concerned, only one man ceased duty, and he was not a regular employee. He thought this was due in a large measure to co-partnership. Mr. Cash spoke of the good work of Sir David Milne-Watson, and complimented him upon the honour of knighthood the King had recently conferred upon him. Having dealt with the cost of coal during the coal strike, Mr. Cash went on to say that it would be remembered that the pre-strike price of gas was 9·8d. per therm. On Oct. 1 the price was increased to 10·4d. per therm, and on Oct. 28 to 11d., and on Jan. 31 to 1s. They had deferred any increase until after Michaelmas, though they had had to purchase foreign coal at a much earlier date. The increase in the price of coal was 84 p.ct., but their increase in the price of gas amounted only to 22½ p.ct. On March 31 the price would be reduced again to 11d.—an increase of only 12·4 p.ct. on the pre-strike price of 9·4d. per therm. There was an increase in the sale of gas for the whole year of 3·28 p.ct. This was exceptionally satisfactory, considering that during the latter part of 1926 they had to ask their consumers to exercise economy. The increase of gas consumed during the past three years was equal to 17½ p.ct. The new showrooms at Purley had been completed. They did the Company great credit. Additional consumers during the year numbered 3142, which compared with 3062 in 1925, and 2757 in 1924. The Chairman concluded by expressing pleasure at the success which had attended the introduction of the co-partnership system, and by thanking the officers and men for their past loyalty to the Company. The report was adopted. On the proposition of the Chairman, the following dividends were adopted: On the preference stock, 7½ p.ct.; on the sliding-scale stock, 6½ p.ct.; and on the maximum dividend stock, 5 p.ct.

Exeter.

The Exeter Gas Light and Coke Company, at an extraordinary meeting following the annual meeting, approved an application to the Board of Trade for a Special Order empowering the Company to acquire the undertaking of the Topsham Gas Company, to acquire additional gas lands and construct additional gas-works, to extend the area of supply, and to increase the capital and borrowing powers of the Company. Another object is to establish a profit-sharing scheme. The Chairman, Mr. G. Hardy Harris, referring to the building expansion in Exeter, said the Company must expand. Topsham was already in their legal area of supply, but they required further powers to purchase the gas undertaking. They had entered into a provisional agreement on satisfactory terms. They would apply for power to increase their capital by £100,000, to be taken up gradually. During the last sixteen years the sales of gas had more than doubled. At the annual general meeting the Chairman said the past year had been one of great anxiety, owing to the coal stoppage, but the Company were able to supply their customers with gas at full pressure and standard quality. The stoppage cost the Company close on £30,000; but the loss had been reduced by the larger sale of gas and residuals, and the increased price of gas since October, to about £13,500, which was wholly met out of revenue. The Company made a profit for the year of £12,304. From Lady-day next the price of gas would be reduced from 9½d. per therm to the old price of 8d. It was decided to pay the following dividends: 4 p.ct. on the preference stock, 7 p.ct. on the new ordinary shares, and 10 p.ct. on the original stock, less income-tax in each case.

Harrogate.

The net revenue balance available for the payment of the half-year's dividend on the consolidated ordinary stock was £18,483; and the Directors recommended payment of dividends at the statutory rate, making 10 p.ct. per annum. The output of gas has increased by over 46 million c.ft.—or 9·2 p.ct. As previously announced in our columns, negotiations are pending for the purchase of the Knaresborough Urban District Council's gas undertaking. The extensions of supply to rural areas already carried out by the Company have been greatly appreciated. Mr. Francis Barber, the Chairman, in moving the adoption of the report and accounts at the annual meeting on Feb. 15, said that the increase in the Company's coal bill, due to the strike, was £21,761—equivalent to one sixth of the total turnover. This necessitated an increase in the price of gas, but they had been able to reduce it to the pre-strike price as from Dec. 31 last. They intended that Harrogate should be regarded as the premier Spa in the world; and with this in view the Company urged that the use of coal should be abandoned, and that coke should be substituted. They had given much thought to the production of a high-class coke for domestic use; and the compulsory employment of coke during the coal strike had made many converts. The success attained had induced the Board to approve of an installation of the most up-to-date breaking and grading plant, at a cost of over £10,000. The average price charged for gas during the year was within the limit on which the Company were authorized to declare the usual co-partnership bonus. As showing the healthy development of business, 2546 appliances were sold during the year, and 983 additional meters had been fixed. Mr. Barber said he was convinced that, outside the areas in which there was a great demand for power, gas was commercially unassailable. In 1925 the Company's "leakage" of gas was 4·05 p.ct., while that of electricity generated by the Corporation undertaking was 14·48 p.ct. in the same period.

Hexham.

The annual report of the Hexham Gas Company shows a gross profit of £3131; and the Directors recommend a dividend of 3½ p.ct. (less income-tax) on the ordinary stock, making 6 p.ct. for the year. This will leave £972 to be carried to the next account.

Ipswich.

Encouraging facts regarding the year's working were told at the annual meeting by the Chairman of the Ipswich Gas Company, Mr. Henry Woodall. During the year they sold 710 million c.ft.—a figure which constituted a record—and added 745 new consumers to their list. Turning to the revenue account, they would see that coal and oil exceeded last year's figure by £26,700. Residuals brought in £1000 more, and from gas their income was £10,700 more, due partly to increase in output and partly to increase in price. The result was that the balance of revenue account was £6387—£6763 less than a year ago. The cost of the dividend recommended was £6143; and deducting this from the carry-forward of £12,156, they would carry into the next year's account the sum of £6013. Considering the difficulties the Company had been through, he regarded the result as satisfactory. They were paying the full statutory dividend; they had added £1500 to their superannuation fund; and to their reserve, special purposes, and renewals funds they had added, including interest, just under £5000. With regard to the price of gas, it was not until more than five months after the stoppage that this was raised by 1d. a therm. Late in November, it was again raised, this time by 2d. a therm. These increases by no means met the increased cost of coal; but in spite of this he could announce a reduction in price, to take place at the end of the current quarter, of 1⅛d. per therm, or 6d. per 1000 c.ft. He was hopeful that by the end of the year they would be back to the pre-stoppage price. On the motion of the Chairman, seconded by Mr. P. W. Cobbold, a dividend was proposed at the rate of £5 15s. p.ct. on the consolidated stock, and 5 p.ct. on the redeemable stock, making with the interim dividend a dividend for the year of £6 1s. 3d. and 5 p.ct. respectively. Votes of thanks to the Directors and staff terminated the meeting.

Littlehampton.

After payment of debenture interest and other charges, and interim dividend, the profit and loss account showed a balance available for dividend of £4420. At the meeting on February 23—Mr. W. Harwood, J.P., the Chairman, presiding—dividends were declared of 11 p.ct. on the "A" shares, 8 p.ct. on the "B" shares, 5½ p.ct. on the "C" shares, and 6 p.ct. on the preference shares, less income-tax. The quantity of gas sold during the year was nearly 92 million c.ft.—an increase of 12 millions. To meet this increased demand, the Directors have decided to instal a carburetted water gas plant capable of making 150,000 c.ft. per 24 hours.

Long Eaton.

After payment of interest on loans, and the full year's dividend on the preference shares, the balance on net revenue account was £6873. The Directors recommended confirmation of the interim dividends of 2½ p.ct. (actual) on the "A" stock, and 2 p.ct. (actual) on the "B" stock (less tax), and payment of final dividends of 5 p.ct. (actual) on the "A" stock, and 4 p.ct. (actual) on the "B" stock, making for the year 7½ p.ct. and 6 p.ct. respectively (less tax). Mr. G. Stevenson, the Engineer, Secretary, and Manager, has been elected a Director of the Company.

Shirebrook.

The Shirebrook and District Gas Company held their annual meeting on Feb. 23, at Nottingham. Mr. J. N. Derbyshire, the Chairman, in moving the adoption of the report, said that, notwithstanding the heavy cost of coal, due to the strike, the Company did not increase the price of gas to prepayment consumers. The price to ordinary consumers was raised by 1d. a therm, but for a short time only. To provide the capital required for recent extension of mains, the Company decided to exercise their remaining powers—viz., £10,000, making the total issued capital £50,000. The issue was readily subscribed without a public appeal. The report was unanimously adopted, as also was the recommendation of a dividend of 10 p.ct. for the year.

South Shields.

At the annual meeting of the South Shields Gas Company, Sir James Readhead, Bart., Chairman, remarked that during the general strike the whole of the Company's employees remained loyal; and throughout the coal strike a full supply of gas had been maintained. Owing to the high prices paid for coal and gas oil, the Directors were compelled to increase the price of gas during the quarter ended Dec. 31 by 3·8d. per therm. At the end of the year, however, with a return to normal conditions, they were able to reduce the price by 3·2d. per therm, and they hoped to make a further reduction during the present year. Despite intense competition, sales of gas had increased by nearly 2 million c.ft. The total income was £175,892, and the expenditure £155,719, leaving a profit of £20,173, compared with £21,922 for the previous year. Mr. Henry Chapman moved a dividend on the consolidated and new stocks equivalent to 8½ p.ct. for the year, and on the ordinary stock to 5¾ p.ct. for the year. The resolution was carried unanimously.

Wellington.

At the annual meeting of the Wellington Gas Company—Mr. C. W. Leake presiding—a profit of £4219 was reported. The Directors recommended the payment of a dividend at the rate of 6½ p.ct. per annum on the redeemable preference and ordinary stocks for the half-year ended Dec. 31 last, making, with the interim dividend already paid, 6½ p.ct. for the year, less t·x. The sale of gas showed an increase of 7¾ million c.ft., following an increase of 8½ million c.ft. in 1925. A full and uninterrupted supply of gas was maintained during the period of the coal stoppage.

Yarmouth.

The meeting of the Great Yarmouth Gas Company was held on Feb. 21. The Chairman, Mr. C. S. Orde, J.P., said that, due to the coal strike, 4434 tons of foreign coal had been purchased, at a cost of £6654 above pre-strike price. Partly to recoup this extra expenditure, the price of gas was raised on Oct. 1 by 6d. per 1000 c.ft. They hoped, however, to announce the withdrawal of this increase at an early date. During the whole period of the strike, the supply of gas was fully maintained, and of a quality and pressure at the usual standard. The result of the year's trading was a profit of £6857—a satisfactory result.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market remains dull and without special features. Gas coal is in slightly better demand on home account; but business for export is still very difficult to obtain. Collieries generally are maintaining recent quotations; but consumers on the Continent seem to expect still further reductions, and are holding off for all except immediate requirements. One or two orders have come to the Tyne for forward contracts, principally in steam coals, but these are largely in the hands of speculators. In some instances the prices indicate that they expect lower quotations to rule later.

Coke is still a good market, and all kinds are in steady demand. On the other hand, coking coals are weak owing to absence of export trade, and are obtainable now at 15s. 6d. to 16s. f.o.b. Wear Special gas makes are quoted at 18s. Best qualities (Holmside, Boldon class) are plentiful, but are inclined to keep steadily to 17s. or 17s. 6d. Seconds are 15s. 6d. to 16s. 3d. f.o.b.

YORKSHIRE AND LANCASHIRE.

Gas coals in the open markets in Yorkshire and Lancashire are slightly discounted from contract figures.

There is no apparent increase in the demand for the better grades of domestic coal, although those of a secondary quality are moving fairly steadily.

The industrial market is unaltered, with the "key" trades rather slow in recovering from the effects of the recent stoppage.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 22s. 3d. to 23s.; screened gas coal, 22s. 6d. to 23s. 6d.; washed trebles, 26s. to 26s. 6d.; washed doubles, 22s. to 23s.; washed singles, 20s. to 20s. 3d.; washed smalls, 16s. 6d. to 17s.; unwashed doubles, 17s. to 18s.; rough slack, 13s. to 13s. 6d.; smithy peas, 23s. to 25s. 6d. per ton. West Yorkshire—Hartleys (f.o.b. Goole), 21s. to 22s. 6d.; washed trebles, 26s. 6d. to 27s.; washed doubles, 21s. to 22s.; washed singles, 18s. 6d. to 20s.; washed smalls, 14s. 6d. to 15s. 6d.; unwashed doubles, 17s. to 18s. 6d.; rough slack, 14s.; coking smalls, 11s. 6d. per ton. Derbyshire and Nottinghamshire—Top hards, 23s. to 25s.; washed doubles, 22s. to 23s.; washed singles, 20s. to 21s.; washed smalls, 14s. 9d. to 15s. 6d.; unwashed doubles, 17s. to 18s.; rough slack, 13s. 6d. to 14s. 6d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 19s. to 20s.; gas coke, 34s.; furnace coke, 27s. 6d. per ton.

MIDLANDS.

The gas coal trade is devoid of feature Deliveries against old contracts are regular, and engineers are content to fill up deficiencies with spot lots, of which there is no lack. The indications are that this policy will be pursued till June. Then, if all goes well, equilibrium will be re-established on the basis of new annual contracts. Supplies of gas coke are more abundant and cheaper.

Easy market conditions prevail as regards almost every sort of coal; and strains must be ascribed to disordered transport. Complaints are still rife as to the unsatisfactory working of railway transport. Inadequate engine power is a more frequent cause of trouble than wagon shortage. Pithead prices have a wide range so far as household coal is concerned. The best grades still make up to as much as 45s. At the other end of the scale coal can be got as low as 25s., though it is such as would ordinarily be classified as industrial quality. Good grades of house coal can be bought between 36s. and 40s.

Industrialists still confine their orders to present requirements. Steams fetch 21s. to 25s.; D.S. nuts, 15s. to 16s.; beans, 12s. to 12s. 6d.; peas, 10s.; slacks of fair quality, 6s. to 8s.

Durham foundry cokes are offered at 30s. to 35s. The minimum contract price at ovens for blast-furnace coke is 21s.; and to get prompt delivery, furnacemen pay 5s. to 6s. premium.

TRADE NOTES.

"B.T.H." Publications.

The British Thomson-Houston Company, Ltd., of Rugby, have sent us a complete set of their lists on electrical and turbine machinery, control gear, &c. The arrangement of the lists for easy reference is very good.

Drakes' Verticals.

Messrs. Drakes, Ltd., of Halifax, have published a leaflet in which a few facts concerning their verticals are graphically expressed.

"Cascade" Tar Plant for Clacton.

Messrs. Clayton, Son & Co., Ltd., of Leeds, have received an order from the Clacton Urban District Council Gas and Water Department for one of their "Çascade" system tar dehydration plants of a capacity of 10 tons per day.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 28.

The market for pitch continues quiet. The current value is about 105s. to 110s. per ton in bulk at makers' works.

Creosote is firm at about 8¾d. to 9d. per gallon, and supplies are scarce.

Tar spirits are steady, pure benzole being about 2s. 3d. per gallon, and pure toluole about 2s. 5d. to 2s. 6d. per gallon. Solvent naphtha is in little demand, and is quiet at about 1s. 9d. per gallon for 95/160 quality.

Phenol is steady at about 6d. per lb. in large drums and overcasks.

Tar Products in the Provinces.

Feb. 28.

The average values for gas-works products during the week were: Gas-works tar, 72s. 6d. to 77s. 6d. Pitch, East Coast, 97s. 6d. to 102s. 6d. f.o.b. West Coast—Manchester, 95s to 100s.; Liverpool, 97s. 6d. to 102s. 6d.; Clyde, 100s. to 102s. 6d. Benzole, 90 p.ct., North, 1s. 9d. to 1s. 10d.; crude, 65 p.ct. at 120° C., 1s. 2d. to 1s. 2½d., naked at makers' works; 50-90 p.ct. naked, North, 1s. 10d. to 1s. 11d. Toluole, naked, North, 1s. 8½d. to 1s. 9½d., nominal. Coal-tar crude naphtha, in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5½d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 7½d. to 7¾d.; salty, 7¼d. to 7½d.; Scotland, 7½d. to 7¾d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 1s. 8½d. to 1s. 9½d. prompt. Naphthalene, £11 to £14; salts, 100s. to 110s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

CONTRACTS OPEN.

Coal.

Tenders are invited by the Audley Urban District Council for the supply of gas coal and engine slack. [See advert. on p. 547.]

Pipes, &c., Lamp Columns, and Stores.

Tenders are invited by the Tipton Urban District Council for the supply of steel and iron pipes, lamp columns, general stores, &c. [See advert. on p. 547.]

Pipes, Cookers, Meters, and General Stores.

The Colwyn Bay Urban District Council are inviting tenders for the supply of pipes, cookers, meters, and general stores. [See advert. on p. 547.]

Thirty Years Ago and Now.

In the course of the proceedings at the Annual Meeting of the East Grinstead Gas and Water Company, Mr. D. T. Livesey, Engineer, Manager, and Secretary, made the following statement with regard to the progress during his management: In the balance-sheet for 1893, the year previous to my coming here, I note that the gas sold that year was 9,972,700 c.ft. Last year it was 82,801,000 c.ft. The contract prices paid for coal in 1893 were 13s. 6d. and 13s. 9d.; the cost into stores being 16s. per ton. This year it varied from contract prices of 32s. 6d. to 80s. per ton for the strike prices. The income from gas rental in 1893 was £2661, during last year £19,186. The water rental in 1893 was £1208, last year £7539. Residuals in 1893 accounted for £681, and last year for £4945. The capital expended in 1893 was £27,042; it is now £102,493. This includes both gas and water expenditure. The price of gas in 1893 was 4s. 7d. per 1000 c.ft., last year 4s. 0½d. per 1000 c.ft. The dividends paid in 1893 were 6 p.ct. and £4 4s. p.ct., against the present dividends of 10 p.ct. and 7 p.ct., the maximum allowed. Some may ask how this has been done. Gas at 4s. 7d., coal at 16s., dividends at 6 p.ct. and 4 p.ct.; against gas at 4s., coal at 32s. 6d. to 80s., and dividends at 10 p.ct. and 7 p.ct. In 1910, when our last Act was obtained, we had to divide the water capital from the gas, and the two were then found to be about equal. This was probably the case also in 1893; and assuming that figure, the gas capital expended in 1893 was about £1400 per million c.ft. of gas sold, while now it is £488. I have always held that small provincial gas-works never wear out the apparatus and plant; they outgrow it. No part of the present plant was in use in 1893 except a gasholder built that year. By judicious purchase of second-hand plant, the present works has been built-up, with the result named; and that is why at the present time we are selling gas upwards of 2s. per 1000 c.ft. cheaper than our immediate neighbours, and paying our full dividends.

Extensions at Sidmouth.—It was announced at the February meeting of the Sidmouth Urban Council that the Gas Committee hoped to be able to recommend at the next meeting a reduction in the price of gas, to come into operation from March 31. It was decided to hold a special meeting early in March to consider a report from the Manager as to the extensions required at the gas-works. Mr. J. G. H. Halse, Chairman of the Committee, said the extensions required involved an estimated expenditure of about £16,000.

Honorarium to Neath Gas Manager.—An honorarium of £50 has been granted by the Neath Town Council to Mr. W. Clark Jackson, their Gas Manager. The Chairman of the Gas Committee (Alderman M. G. Roberts, J.P.) pointed out that Mr. Jackson had done very good work during the last nine months. They had passed through a serious crisis, and had needed a man with sound business brains to help them; and Mr. Jackson had done this. The Committee could not see their way clear to raise his salary; but they were unanimous that £50 gratuity should be granted to him.

JUST OUT

The 1927

MAIN

COOKER CATALOGUE

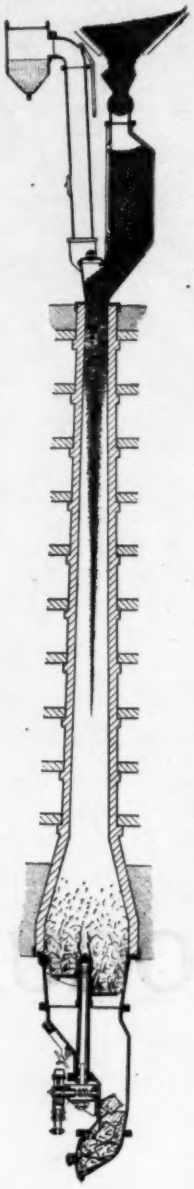
giving particulars of the latest improvements incorporated into the tried and tested "Main" system of standardisation and interchangeability.

Enclosed with each Catalogue is a special leaflet on another interesting "Main" innovation —STAINLESS AND UNTARNISHABLE TAPS, which can be supplied on Cookers of High-Grade finish.

See that your Showrooms have copies for reference.

R. & A. MAIN, Ltd., LONDON AND FALKIRK

London Office and Showrooms, 38, Grosvenor Gardens, S.W. 1
Glasgow Office and Showrooms, 82, Gordon Street



Glover-West Vertical Retorts *for* DURHAM COALS

	CUBIC FEET PER DAY
NEWCASTLE-UPON-TYNE	2,500,000
ditto . . . Extension	3,000,000
DARLINGTON	2,000,000
ditto . . . Extension	1,000,000
GOTHENBURG	1,250,000
ditto . . . Extension	1,250,000
BERGEN	750,000
BLYTH	1,500,000
COPENHAGEN, Eastern	3,000,000
ditto . . . Valby	4,400,000
GAS LIGHT & COKE CO., Fulham	7,000,000
ditto . . . . . Nine Elms	7,250,000
PLYMOUTH	4,000,000
TORQUAY	1,800,000
HEXHAM	500,000

These installations are daily carbonising 2,750 tons of Durham Gas Coals.

West's Gas Improvement Co. Ltd.

Miles Platting
MANCHESTER

Telephones—
CENTRAL 5961 (3 lines)

Telegraphic Address:—
"STOKER, MANCHESTER"

LONDON
Regent House, Kingsway, W.C.2
Telegraphic Address:—"IMVERTRET, WESTCENT, LONDON"
Telephone:—REGENT 0387

SYDNEY
Union House, 243, George Street, Sydney, N.S.W.
Telegraphic Address:—"VERTICAL, SYDNEY"

NEW YORK (U.S.A.)
WEST GAS IMPROVEMENT Co. OF AMERICA
Incorporated
441, Lexington Avenue, New York
Telegraphic Address:—"VERTICALS, NEW YORK"
Telephone—MURRAY HILL 7242

PARIS
CIE. GLE. DE CONSTRUCTION DE FOURS
8, Place des Etats-Unis, MONTROUGE (Seine)
Telegraphic Address:—"CORMIQUES-MONTROUGE (Seine)"
Telephone:—SEGUR 92-63 & 92-64

STOCK MARKET REPORT.

THE general tone of the stock markets was uncertain last week. There was an attitude of caution. While actual selling was not on a large scale, operators restricted their commitments, and high-class investment stocks showed a reactionary tendency. The large number of recent new issues also played a part in the depression; and it was reported that the latest of these—that of the Sheffield Corporation loan—was only partly successful. The new £2,000,000 issue by Bristol due this week does not therefore look very promising.

The Foreign Market was no exception to the general rule; but Home Rails were distinctly better, and more optimistic views are expressed as to the prospects of the current year.

There were some bright spots in the Industrial and Miscellaneous markets. Kaffirs were especially active, and more interest was taken in Textiles and Rubbers. Oils fell away; but Newspaper and Catering shares were firm and well supported.

The Gas Market was quite steady. It will be seen by the Table that there were no changes in the quotations other than the usual marking down for *ex* div. prices. Among the half-yearly dividend announcements during the past week were:

East Hull ordinary, £5 p.ct. per annum; Hornsey 3½ p.ct., £5 p.ct. per annum; North Middlesex original, £11 10s. p.ct. per annum; North Middlesex ordinary, £8 1s. p.ct. per annum; Hastings 5 p.ct., £6 15s. p.ct. per annum; Hastings 3½ p.ct., £5 5s. p.ct. per annum; and South Shields Cons., £8 10s. p.ct. per annum. All of these are at the same rates as the corresponding half-year.

The following transactions were recorded during the week:

On Monday, Bombay 22s., Commercial 3 p.ct. debenture 56, European 6¼, Gas Light and Coke 87⅛, 87⅞, 88, 3½ p.ct. maximum 60, 3 p.ct. debenture 59, Imperial Continental 134½, Lea Bridge 5 p.ct. 97, Primitiva 14s. 3d., 14s. 4½d., 14s. 5¼d., 14s. 6d., 14s. 7½d., South Metropolitan 99½, South Suburban 5 p.ct. 103½. Supplementary prices, British, Hull 5 p.ct. debenture 95¾, 96, Norwich 3 p.ct. debentures, 53, Croydon, 7⅛ p.ct. preference 103½, 103¾, Southend-on-Sea 5 p.ct. new 83.

On Tuesday, Bournemouth 5 p.ct. 12⅝, British 108¼, European 6½, 6 1/16, Gas Light and Coke 87¼, 87⅞, 88, 3½ p.ct. 60½, 4 p.ct. preference 77, 3 p.ct. debenture 59¼, 59½, 60, Imperial Continental 134½, Primitiva 14s. 3d., 14s. 7½d., San Paulo 6 p.ct. preference 7⅞, Sheffield "C" 97, South Metropolitan 98¾, 99¼, 3 p.ct. debenture 59¼, 59⅜, Swansea 6½ p.ct. debenture 103½, Uxbridge Maidenhead 5 p.ct. preference 87. Supplementary prices, British, Norwich 3 p.ct. debentures 54½, Cheltenham 5 p.ct. 77¼.

On Wednesday, Alliance and Dublin 84½, Bournemouth "B" 12⅛, British 110, 7 p.ct. preference 116, Colonial 26s. 3d., 8 p.ct. preference 21s. 7½d., 21s. 9d., Commercial 4 p.ct. 85, 85½, 3½ p.ct. 82½, European 6½, 6 1/16, 6 3/32, Gas Light and Coke 87⅛, 87⅜, 87½, 87⅞, 3 p.ct. debenture 59½, 60, Imperial Continental 135, 136, Maidstone 5 p.ct. 112, Primitiva 14s. 7½d., South Metropolitan 98½, 99, 99¼, 99⅜, 6½ p.ct. debenture 102½, South Suburban 5 p.ct. 102, 102½, Wandsworth "C" 91. Supplementary prices, Bournemouth 6 p.ct. preference 11½.

On Thursday, Bournemouth 5 p.ct. 13⅛, 4 p.ct. debenture 75, 76, European 6⅜, Gas Light and Coke 87½, 87⅜, 88¼, 3 p.ct. debenture 59½, 5 p.ct. debenture 100, Imperial Continental 136, Maidstone 5 p.ct. 113 *ex* div., Primitiva 14s. 3d., South Metropolitan 96½, 97½ *ex* div. Supplementary prices, Bath 89½, Folkestone 74, Tottenham 7½ p.ct 102½, 102¾.

On Friday, Alliance and Dublin 83 7/16, Brighton "A" 129, 129½, European 6⅜, Gas Light and Coke 87½, 87⅜, 88¼, 3½ p.ct. maximum 59¼, 4 p.ct., preference 76, 76¼, 77, 3 p.ct. debenture 59½, 60½, 5 p.ct. debenture 99 1/16, Imperial Continental 134½, 3½ p.ct. debenture 68, 68½, Primitiva 14s. 3d., 14s. 4½d., 14s. 6⅜d., 14s. 7¼d, South Metropolitan 96½, 96¾. Supplementary prices, Bournemouth new 6 p.ct. preference 11⅛, British 5 p.ct. debenture 96.

The principal point of interest in the Money Market was the high average rate—£4 9s. 4·78d. p.ct—at which Treasury Bills were allotted. The result, which was up to expectation, led to a further advance in market discount rates. Money was in good supply, and 4 p.ct. was paid for both old and new day-to-day loans. Some relief is expected in rates during the current week by reason of the distribution of dividends on various Government stocks.

On the Foreign Exchange Market the dollar-sterling rate on New York remained firm, and closed at 4.85⅛. French francs were a trifle dearer at 123.97½, and also Italian lire at 110·90. Belgas were finally quoted at 34·88, and the German exchange at 20.46¼.

Silver was a quiet market. The price remained at 26 5/16d. per oz., and Gold, with no supplies available, at 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3, 1925. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 25.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 10	5	5	Aldershot 5 p.c. max. C.	70—73	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	65—71	..	..
1,561,868	,,	Sept. 30	6½	6½	Alliance & Dublin Ord.	81—86	..	83 7/16—84½
374,000	,,	Jan. 13	4	4	Do. 4 p.c. Deb.	65—68	..	..
300,000	1	Oct. 14	1/7½	1/7½	Bombay, Ltd.	1—1⅛	..	22/-
170,000	10	Aug. 26	8½	8½	Bournemouth 5 p.c.	12—13	..	12⅝
300,050	10	,,	7	7	Do. B 7 p.c.	12—13	..	12½—13⅛
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	Jan. 13	3	3	Do. 3 p.c. Deb.	53—56	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	73—76	..	75—76
214,740	,,	Aug. 26	12	12	Brighton & Hove Orig.	163—168	..	..
344,200	,,	,,	9	9	Do. A Ord.	125—130	..	129—129½
1,327,500	,,	Feb. 24	5	5	Bristol 5 p.c. max.	84½—85 1/16a*	—1	..
885,000	,,	Sept. 30	7	8	British Ord.	107—110	..	108½—110
100,000	,,	Dec. 30	7	7	Do. 7 p.c. Pref.	112—117	..	116
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	75—80	..	..
100,000	10	Dec. 9	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Oct. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 30	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	Feb. 24	6	6	Cardiff Con. Ord.	95—96*	—2	..
287,860	,,	Dec. 30	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
187,150	,,	Feb. 24	5	6½	Chester 5 p.c. Ord.	86½—91½b*	—2½	..
79,185	1	Sept. 30	†2/-	†2/-	Colombo Ltd. Ord.	27/—29/-	..	..
24,495	1	,,	1/4¢	1/4¢	Do. 7 p.c. Pref.	20/—22/-	..	..
321,490	1	Oct. 14	1/9⅜	1/7½	Colonial Gas Assn. Ld. Ord.	25/—27/-	..	26/3
173,900	1	,,	1/9⅜	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	21/7½—21/9
1,513,280	Stk.	Feb. 24	5½	5½	Commercial 4 p.c. Cap.	82—85*	—2	85—85½
560,000	,,	,,	5/3/4	5/3/4	Do. 3½ p.c. Cap.	80—88*	—1	82½
475,000	,,	Dec. 30	3	3	Do 3 p.c. Deb.	54—57	..	56
800,000	,,	Sept. 30	§2	§1	Continental Union, Ltd.	28—33	..	..
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	82—85	..	..
787,560	,,	Aug. 12	6½	6½	Croydon sliding scale	96—99	..	..
403,100	,,	,,	5	5	Do. max. div.	78—81	..	..
492,270	,,	Feb. 24	6	9	Derby Con.	106—108a*	—1	..
65,000	,,	Dec. 30	4	4	Do. Deb.	73—75e	..	..
200,000	,,	Sept. 16	5	5	East Hull Ord. 5 p.c.	78—82	..	..
50,000	,,	Dec. 30	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,002,180	10	Sept. 30	†4	†3	European, Ltd.	6—7	..	6½—6 17/32
18,747,460	Stk.	Feb. 10	5/1/4	5	Gas Light & Coke 4 p.c. Ord.	86½—88½	..	87¼—88⅝
2,800,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61	..	59¼—60½
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—77	..	76—77
5,602,620	,,	Dec. 30	3	3	Do. 3 p.c. Con. Deb.	58—61	..	59—60½
181,315	,,	,,	—	6	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	99 1/32—100
1,642,770	,,	,,	—	5	Do. 5 p.c. Red. Deb.	99—100	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 26	6½	6½	Hastings & St L. 5 p.c. Conv	87—92	..	..
268,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	66—71	..	..
70,000	10	Oct. 14	†10	†10	Hongkong & China, Ltd.	12—13	..	..
173,200	Stk.	Sept. 16	5	5	Hornsey Con. 3½ p.c.	69—71	..	..
1,976,000	,,	Nov. 11	†10	10	Imperial Continental Cap.	133—136	..	134½—136
226,170	,,	Feb. 10	3½	3½	Do. 3½ p.c. Red. Deb.	67—69	..	68—68½
235,242	,,	Aug. 12	6½	6½	Lea Bridge 5 p.c. Ord.	94—99	..	97
2,145,907	,,	Feb. 24	6½	6½	Liverpool 5 p.c. Ord.	80—81b*	—2	..
600,000	,,	Sept. 30	7	7	Do. 7 p.c. Red. Pref.	104—106b	..	..
165,736	,,	Feb. 24	9	8	Maidstone 5 p.c. Cap.	110—115*	—2	112—113
63,480	,,	Dec. 30	3	3	Do. 3 p.c. Deb.	52—57	..	..
75,000	5	Dec. 9	†7	†7	Malta & Mediterranean	5½—5¾	..	..
541,920	Stk.	Nov. 25	†6	†5	Montevideo, Ltd.	80—83	..	..
2,061,515	,,	Feb. 24	5	5	Newcastle & Gateshead Con.	69½—70¼d*	—3	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	68½—69¾d*	—2	..
691,705	,,	Dec. 30	3½	3½	Do. 3½ p.c. Deb.	67¼—67 7/8d	..	..
15,000	,,	Aug. 26	11½	11½	North Middlesex 10 p.c.	155—160	..	..
91,580	,,	,,	8 5/8	8 5/8	Do. 7 p.c.	109—114	..	..
300,000	,,	Nov. 25	7	9	Oriental, Ltd.	97—102	..	..
188,190	,,	Dec. 30	7¼	7¼	Plym'th & Ston'house 5 p.c.	105—110	..	..
414,500	,,	Feb. 24	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	100—105*	—2	..
236,732	,,	,,	5	5	Do. 5 p.c. max.	76—79*	—2	..
1,989,909	1	—	—	—	Primitiva Ord.	14/—15/-	..	14/3—14/7½
282,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	84—86	..	..
600,000	Stk.	Jan. 27	4	4	Do. 4 p.c. Red. Deb. 1911	69—71	..	..
434,963	,,	Dec. 30	—	4	Do. 4 p.c. Cons. Deb.	69—71	..	..
150,000	10	Sept. 30	6	6	San Paulo 6 p.c. Pref.	7½—8	..	7⅞
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	47—50	..	..
270,000	Stk.	Sept. 16	6	5⅝	Sheffield A	96—98e	..	..
419,968	,,	,,	6	5⅝	Do. B	96—98e	..	..
1,047,000	,,	,,	6	5⅝	Do. C	96—98e	..	..
90,000	10	June 11	4	—	South African	4—6	..	..
6,809,895	Stk.	Feb. 24	5	7	South Met. Ord.	96—98*	—2	96¼—99⅜
1,896,445	,,	Jan. 13	3	3	Do. 3 p.c. Deb.	57—60	..	59⅜—59⅝
794,000	,,	Sept. 16	6½	6½	Do. 6½ p.c. Red. Db.	101—103	..	102½
91,500	,,	Feb. 24	8½	8½	South Shields Con.	112—116d*	—2	..
1,243,795	,,	Aug. 12	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	102—103½
368,837	,,	Dec. 30	5	5	Do. 5 p.c. Deb.	93—96	..	..
847,740	,,	Oct. 14	5	5	South'mpton Ord. 5 p.c. max.	75—79	..	..
121,275	,,	Dec. 30	4	4	Do. 4 p.c. Deb.	68—73	..	..
250,000	,,	Feb. 24	7	7	Swansea 7 p.c. Red. Pref.	100—102*	..	..
200,000	,,	Dec. 30	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	103½
120,000	,,	Feb. 24	7½	7½	Tottenham District A 5 p.c.	105—110*	..	..
883,275	,,	,,	6½	6½	Do. B 5½ p.c.	89—92*	—2	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100*	—1½	..
161,255	,,	Dec. 9	4	4	Do. 4 p.c. Deb.	72—75	..	..
258,251	,,	Aug. 26	5	5	Tynemouth Con. and New	69½—70½d	..	..
197,294	,,	Aug. 26	6⅜	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	87—92	..	..
88,830	,,	,,	5	5	Do. 5 p.c. pref.	83—88	..	87
91,800	,,	,,	6⅜	6½	Do. 5 p.c. Maidenh'd	85—90	..	..
30,000	,,	July 8	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	122—127	..	..
365,836	,,	,,	7	7	Do. B 5½ p.c.	102—107	..	..
422,533	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	91
323,000	,,	,,	6⅜	6⅜	Wimbledon 5 p.c.	98—103	..	..
98,000	,,	,,	7½	7½	Epsom 5 p.c.	104—109	..	..
88,416	,,	Dec. 30	3	3	3 p.c. Deb.	54—57	..	..

Quotations at:—a.—Bristol, b.—Liverpool, c.—Nottingham, d.—Newcastle, e.—Sheffield. *Ex. div. † Paid free of income-tax. ‡ Plus 5½ p.ct. p.a. special dividend. § For year.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom & Ireland	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Dominions & Colonies & U.S.A. Payable in Advance		35/-	—	—
Other Countries in the Postal Union. Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Central 6055.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE, 34, OLD BROAD STREET, LONDON, E.C. 2.

OXIDE OF IRON
AS SUPPLIED BY THIS COMPANY FOR OVER 50 YEARS ON SALE OR LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

Telegrams: "PURIFICATION STOCK, LONDON." *Telephone:* LONDON WALL, 9144.

PATENTS, Trade Marks. Inventions Advice, Handbook and Consultations free. KING'S PATENT AGENCY LTD., Director B. T. KING, C.I.M.E., Regd. Patent Agent, G.B., U.S., and Can., 146A, QUEEN VICTORIA ST., E.C. 4, and 6, QUALITY CT. (next Pat. Off.), LONDON, W.C. 40 years' refs. 'Phone Cent. 682.

CARBONATE OF AMMONIA
Special Quality for Neutralising Sulphate.
BROTHERTON & Co., LTD., LEEDS.

WEIGHBRIDGES
FOR Motor Lorries and Railway Traffic can be seen erected at our works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.
CHARLES ROSS, LIMITED, SHEFFIELD.

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., 86, Mark Lane, LONDON, E.C. Works—SILVERTOWN. Telegrams—"HYDROCHLORIC, FEN, LONDON." Telephone—ROYAL 1166.

J. E. C. LORD (Manchester), Ltd., Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, &c.

WE Specialize in Small Gas-Works and Solicit Inquiries for COMPLETE WORKS EXTENSIONS, and RENEWALS.
Penney & Porter (Engineers), Ltd.,
LINCOLN.
Established 1855.
Telegrams: Porter, Lincoln. Telephones: 266 & 211.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 215, Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.,
99, LONDON ROAD, LEICESTER.
Telegrams: "BRIPURIMAT, LEICESTER." Telephone: LEICESTER 5096.
Solicit enquiries for:—
NATURAL BRITISH PURIFYING MATERIAL,
NATURAL HYDRATED OXIDE OF IRON,
FIRST QUALITY DUTCH BOG ORE,
BEST QUALITY BELGIAN BOG ORE,
"PREPARED" AND "UNPREPARED" ARTIFICIAL OXIDES.
SPENT OXIDE PURCHASED.
LONDON OFFICE:
34/35, NORFOLK STREET, STRAND, W.C. 2.
Telegrams: "BRIPURIMAT ESTRAND LONDON." Telephone: CENTRAL 4545 & 4546.

"LUX" PURIFYING MATERIAL.
THE PREMIER MATERIAL FOR GAS PURIFICATION.

THOS. DUXBURY AND CO.
SOLE AGENTS FOR
ENGLAND, SCOTLAND, IRELAND, WALES AND THE COLONIES (except CANADA).
16, DEANSGATE, MANCHESTER. *Telegrams:* "Darwinian, Manchester." *Tel. Nos.:* 3808-9 City.
PALACE CHAMBERS, WESTMINSTER, S.W. 1. *Telegrams:* "Darwinian, Par, London." *Tel. No.:* 0878 Victoria.

GEORGE WILSON GAS METERS, Ltd. for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 268, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E. 11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

ENAMELLED WARE.
SEND your inquiries for Enamelled LININGS, CROWNS, TRAYS, SHELVES, HOODS, &c., for Electric and Gas Stoves, to the—SIMMONS HOLLOWARE COMPANY, LTD., WOLVERHAMPTON, Enamellers for the Trade.

APPOINTMENTS, &c., WANTED.

GAS Cookery Demonstrator, fully qualified (Diplomée National Training School of Cookery), is free to accept Daily or Weekly Engagements.
Miss PARKYN, 192A, WEST END LANE, WEST HAMPSTEAD, LONDON, N.W. 6.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Royal 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Royal 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
(*See* "*Gas Salesman*," *Feb.* 23, *p.* 66.)
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Royal 1484.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, HAS THE FIRST CALL ON YOUR CONSIDERATION.

THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH is considering the appointment of a DIRECTOR OF RESEARCH INTO THE PREVENTION OF WATER POLLUTION AND COGNATE PROBLEMS. Salary will be of the order of £1200 per annum according to qualifications.
Forms of application and further particulars may be obtained from the Secretary of the Department, 16, Old Queen Street, S.W. 1. Applications should reach the Department not later than March 31st.

BINGLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
APPOINTMENT OF SHOWROOM ATTENDANT.
WANTED — Qualified Attendant (Male) for Showroom, Bingley. Must have sound knowledge of Gas Appliances and Fitting Work, and ability to Advise and Estimate for Consumers.
Apply, by letter, in own handwriting, stating Age, Experience, present Post, whether Married or Single, and Salary required, with *copies* of Two recent Testimonials, on or before 7th March, 1927, to the CLERK, TOWN HALL, BINGLEY.

COMPETENT Clerk required by the Morecambe Corporation in the Gas-Works Office. Experience in Works and Distribution Book-Keeping Preferred.
Applications, stating Age, Experience, and Salary required, together with *copies* of recent Testimonials, to be sent to the undersigned marked "Clerk" by the 10th of March, 1927.
THOMAS W. BARRATT, A.M.I.C.E., Borough Gas Engineer and Manager.
Gas-Works, Moss Lane, Morecambe.

A GAS Undertaking (South) is about to create the Position of GENERAL ASSISTANT in the DISTRIBUTION and SALES DEPARTMENT, and invites Applications.
Candidates must have Technical Knowledge, Distribution and Sales Experience, be of good Address, Well Versed in Modern Appliances, Capable of Interviewing and Advising Consumers, Estimating, &c.
Apply, stating Age, Experience, whether Married or Single, and give References to No. 7719, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

WANTED, immediately, Competent RENTAL CLERK, able to Take Charge of all Rental and Ledger Work, small Company. To take up duties at once.
Apply, stating Experience and Salary required, with *copies* of recent Testimonials, to No. 7716, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

CONTENTS.

EDITORIAL NOTES.

When Doctors Differ, then Collaborate . . 577
Assisted Gas Efficiency and Assisted Wiring 578
First Contracting-Out Scheme 578
Co-operative Coal Selling—No Compulsion . 579
New Houses and Gas Connections—An Early Advocate of Maintenance 579
Coal Output—Nine Months' Coal Statistics—Rival Movements—Trade Union Law—Unemployment 580

Personal 580
Obituary—Harry Kendrick 580
Forthcoming Engagements 580
Electricity Supply Memoranda 581
Ideal Home Exhibition—Gas a Good Feature at Olympia 582
Notes on New Books 585
London Juniors' 25th Anniversary Celebration—Splendid Progress of the Association 586
Manchester District Institution of Gas Engineers (Fifty-Seventh Annual Meeting)—
General Business 587
Discussion on Matters of Interest in Connection with Works not Exceeding 200 Millions Output per Annum 589
Society of Chemical Industry—
The Influence of Atmosphere and Temperature upon the Scaling of Steel. Part I. by C. B. Marson, Ph.D., M.Sc., A.I.C., and J. W. Cobb, C.B.E., B.Sc., F.I.C. Part II. by H. T. Angus, Ph.D., M.Sc., and J. W. Cobb, C.B.E., B.Sc., F.I.C. . 591
Society of Chemical Industry—(*continued*).
A Thermal Study of the Process of Manufacture of Water Gas. By A. Parker, D.Sc., F.I.C., M.I.Chem.E. 592
A Study of Coke Formation. By R. A. Mott, M.Sc. 594
Coke in Relation to Some of its Industrial and Domestic Uses. By H. Hollings, M.Sc., and N. E. Siderfin, M.Sc., A.C.G.I. 598
Extensions at Denny and Dunipace—Installation of Glover-West Vertical Retorts . . 604
The Case for the Isolated Student. By Arthur Coe 607

CORRESPONDENCE.

Can Maintenance be Reduced? 608

PARLIAMENTARY INTELLIGENCE.

House of Lords—
Progress of Bills 608
Special Orders 608
House of Commons—
Progress of Bills 608

MISCELLANEOUS NEWS.

Gas Regulation Act Applications 609
Gas Inquiry at Ballymena 609
In Defence of Tar 609
Gas-Works Extensions at Llandudno . . . 609
The Romance of a Piece of Coal 609
Trade Notes 609
Wandsworth, Wimbledon, and Epsom Gas Company—Ordinary General Meeting . . 610
Brighton and Hove General Gas Company—Business Developing Satisfactorily . . . 611
North Middlesex Gas Company—Satisfactory Increase in Business 612

MISCELLANEOUS NEWS—(*continued*).

Barnet District Gas and Water Company—Ten P.Ct. Increase in Gas Sales . . . 612
Gas Companies' Results for 1926 613
Coal Trade Reports—
North-East Coast 615
Yorkshire and Lancashire 615
Midlands 615
Current Sales of Gas Products 616
Contracts Open 616
Stock Market Report 617

PARAGRAPHS.

Will—Spring Meeting of the Midland Association—Power Efficiency 585
Second Conference on Bituminous Coal—The New Works for Johannesburg . . . 590
Manchester Regional Gas Industrial Council 603
Annual Report of the British Legion—Society of British Gas Industries—Tankless Gasholders 606
Southern Association of Gas Engineers and Managers—Scope of the "Feuerfest"—New "B.E.S.A." Specifications—Continental Union Gas Company, Ltd.—Issue of Stock at Leatherhead 608
Cheaper Gas at Birmingham 609
Rochester, &c., Gas Company's Stock Issue—New Gas Retorts for Southport 613
Gas Affairs at Stockton 615
Twelve Butchers Suffer through Electricity—European Gas Company's Dividend—Cardiff Gas Company's Athletic Club—British Industries Fair—Blackpool Gas Finances—Tribute to the Newport (Mon.) Gas Company—Gas at the Bradford Ideal Homes Exhibition 616

"JOURNAL" OFFICE TELEPHONE.
The "Journal" Office Telephone Number is "Central 6055."
For List of "JOURNAL" Advertisers, see p. 620.

GENERAL
"Raised Level"
AND
"Dainty"
COOKERS
ATTRACTIVE
COMPACT
COMPLETE
Combining features which make for
EASE AND SIMPLICITY IN COOKING.

GENERAL GAS APPLIANCES LIMITED
Guide Bridge, Manchester.

Are your meters *only* repaired?

Why not send them to Thomas Glover and have them renewed?

The Thomas Glover Repair Service besides giving the finest workmanship, collects and delivers all repairs by motor lorry, and saves you the expense connected with handling.

Let us send our lorry for your repairs.

ORIGINAL DRY METER MAKERS
ESTABLISHED IN 1844

THOMAS GLOVER & CO. LTD.
GOTHIC WORKS, ANGEL RD. EDMONTON, N.18

Branches at: BELFAST, BIRMINGHAM, BRISTOL, EDINBURGH, GLASGOW, MANCHESTER & NEWCASTLE-ON-TYNE

PARKINSON'S

STATION METERS.

Perfectly accurate in registration.
Many in constant use for over 50 years.
All sizes up to 300,000 ft. per hr.

W. PARKINSON & CO.
INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

Cottage Lane, City Rd., LONDON, E.C.1.	Bell Barn Road, BIRMINGHAM.	Mornington St., Ormeau Rd., BELFAST.
'Grams:—"Index Isling London."	"Gasmeters Birmingham."	"Prepayment Belfast."
'Phone Nos.:—4270 Clerkenwell.	2248 Midland Birmingham.	3374 Belfast.